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On Natural Immunity.*

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That individuals differ among themselves in respect of their records of disease is manifest, and evidence has already been considered which shows clearly that fundamental genetic dissimilarity, yielding differences in general physiological constitution, can account for much of this. The problem now being considered is whether or not species and races are characterised by differences in their susceptibility and immunity to disease. It is known that the guinea-pig and mouse are highly susceptible to infection with anthrax, rabbits less so, and the rat almost immune. The white mouse is said to be immune to glanders, the house mouse somewhat susceptible and the field mouse highly susceptible. Anopheles punctipennis is not infected by the malarial parasite, Anopheles maculipennis most certainly is. The Algerian sheep is far less susceptible to anthrax than is the European sheep. The human is immune to many infections prevalent among his domesticated animals, and these to many of the infections of men. The negro is said to enjoy an immunity to yellow fever, the Mongolian to scarlet fever; the European, it is said, is relatively highly susceptible to yellow fever, diphtheria and intestinal diseases such as cholera, dysentery and typhoid, whereas the darker skinned races are held to be more prone to tuberculosis and other respiratory diseases, elephantiasis and leprosy. The natives of any endemic area are supposed to be relatively immune to the particular disease of that area. The question which must be considered is whether or not these differences exist in fact and, if so, whether or not they are expressions of genetic dissimilarities. Undoubtedly, susceptibility and resistance towards any particular disease vary within fairly wide limits, are seldom absolute, and have no relation to biological relationship.

Natural immunity may be due to one of several causes. The entrance of the organism into the host's body may be prevented by the integrity of the skin and mucous membranes; the invader may at once be disarmed by the activity of enzymes in the skin or by the chemical and physical action of such secretions as the saliva or the gastric and intestinal juices. The organism may be repelled or embarrassed by the movement of cilia. Even though the organism gains entrance, it may be harmless if the particular route of infection required by the organism has not been followed or is not available. Certain tissues confer a marked local immunity to certain organisms—for example, in the case of human diphtheria, the infection very seldom proceeds along the œsophagus. The age of the host influences the conflict as is seen in the case of ringworm, for example, which is a disease of children under seven years of age particularly. The physiological constitution of the host is responsible for differences also, since the decision concerning infectivity is made by the ability or otherwise of the individual to mobilise blood quickly at the site of attack. Constitutional or transient differences in the activity of the leucocytes can account for differences in disease resistance. In certain cases, in tetanus, for example, the organism requires suitable receptors in the body cells of the host before it can become pathogenic. Tetanus toxin, being unbound by the cells, produces no effect upon the turtle and anti-toxin is not elaborated. In the case of the alligator, though the toxin is bound, no harmful effects follow because the body cells are not susceptible to the action of the parasite or of its products. The turtle and the alligator are both naturally immune to tetanus, though for different reasons. In other instances, the natural immunity is not due to the bactericidal properties of the serum or leucocytes nor to antitoxins, but to the presence of substances, the so-called anti-aggressinins, which prevent the micro-organism from exercising its particular aggressive force. In still other cases the natural immunity is due to the fact that in a particular host the parasite fails to find adequate and appropriate nutriment. Such anthreptic immunity may perhaps explain the failure of growth on the part of a tumour transplanted from one species to another. Certain organisms are known to require human protein for their well-being and so are restricted to man.

It is established that this specific and racial natural immunity is a reality. Two different opinions have been advanced to account for it. According to one view, when the pathogenic organism is first introduced to a population, all susceptible individuals—and this means most of the population—become infected, whilst a few, the relatively highly resistant or immune, in virtue of their genetic constitutions, will remain unattacked. The population is thus passed through the sieve of selection. Such as are unable successfully to withstand the attack succumb and in so doing remove themselves from the list of parents of the next generation. Since this next generation arises from the survivors, it will tend to inherit the natural immunity exhibited by its parents. Succeeding generations in their turn are exposed to the same infection until only those who can, for genetic reasons, pass through unscathed are left. The population ultimately consists solely of the descendants of those who possessed a complete or partial natural immunity. Disease resistance from this point of view is not attributable to any immunity acquired by such individuals as, contracting the disease, recover. The second view is that when a disease is first introduced into a population, all individuals are liable to contract it. Some perish and some recover, the result depending mainly upon the severity of infection in different cases. Such as recover, in virtue of the exercise of their defensive mechanisms, have acquired a degree of immunity which persists to

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protect the individual from further attack and which is transmitted in some degree to the offspring, so that these, when in turn they contract the disease, are enabled to develop a still greater resistance. So generation after generation the acquisition is augmented until a specific mmunity characterises the population. This hypothesis, which clearly involves the suggestion that acquired characters are truly heritable, is regarded by most present-day biologists as probably untenable in the light of our knowledge of the origin of the germ-cells, the behaviour of the hereditary characters, and the apparent lack of relation between such mutations as do occur and any discernible causal agency. There is no doubt that antibodies and such like can be communicated from parent to offspring, but in such cases it is clear that the hereditary mechanism is not involved, for the immunised male parent cannot transmit its immunity.

Evidence is slowly accumulating which tends to show that immunities, like susceptibilities, are transmitted as genetic characters, taking the form of antibodies in the blood. The mode of inheritance of blood complement in the guinea-pig has been studied by the usual hybridisation method of genetics. Crosses between strains in which the complement was deficient and normals gave results which showed that the character known as complement was inherited in a manner entirely in conformity with genetic laws. The complement-deficient strains were highly susceptible to disease and ultimately died out from this cause. In the guinea-pig, too, it has been shown in connection with the inbreeding work to which reference has been made, that the different inbred lines exhibited marked differences with respect to disease resistance and that the character high resistance was transmitted in an orderly fashion by males and females of the lines exhibiting this character.

There is one record which shows very clearly indeed how different races react differently to infection. A colony of mice, including Japanese, albinos and hybrids between these, were attacked by a virulent staphylococcal infection. All the Japanese were wiped out, whereas none of the albinos were affected nor were any of the F_1 hybrids. Of the F_2 individuals three in every four survived; of the back-crosses of F_1 and Japanese approximately 50 per cent. survived, and of the reciprocal back-crosses only one out of fifty-one died. These results agree with the assumption that susceptibility and resistance in this case constitute a single factor pair, that resistance is the dominant member of the pair, and that the original Japanese were duplex for the susceptibility factor, the albinos duplex for the recessive factor.

In the case of the human, the problem of natural immunity is very obscure. Yet it is one of the greatest importance, for upon it is based the problem of racial extension and colonisation of habitants differing widely one from the other in the matter of climate and fauna. A true racial immunity can only be recognised when, other things being equal, two races are living under conditions to which each has already become adapted. The recognition of such immunity is made most difficult, however, by differences in racial habits.

The case of osteomalacia may be cited as an example of this. This disease is comparatively very prevalent in the Punjab among certain Hindoo castes and the Borah Mohammedans of the Central Provinces, and in Western India. At first sight it would seem that these communities were genetically so constituted that proneness to osteomalacia was a distinguishing character. But when it is disclosed that among these communities purdah-nishin, with its sedentary seclusion and its unsanitary associations, is the rule, it becomes clear that habits and not genetics are at the root of the difference. Beri-beri is common among the peoples of the East Indies, China, Japan, and Malay, and rare elsewhere, but this is not due to any racial peculiarity but to the fact that these peoples eat such foods as polished rice. A people isolated by physiological, religious, or social barriers, will tend to show peculiarities in its diseases since infections of certain kinds may never reach them. It does not follow that because a disease disappears a people have attained an immunity, improvements in hygiene, public and personal, can account for this. Cholera, typhoid, and such like diseases are rare in Europe, but not because the European is immune thereto. Meteorological agencies play a most important rôle in the causation of disease: they affect the insect hosts of many diseases, governing their habits and distribution; they affect also the pathogenic organism undergoing one part of its life cycle in an insect host in those cases in which such development is conditioned by temperature and humidity. Depressing climatic conditions, in lowering the vitality of the human, rendering him less able to withstand the attacks of pathogenic organisms, also play their part.

The suggestion that the negro contracts yellow fever less readily than does the white is not confirmed by really critical observation, though it would indeed seem to be established that the death-rate from this disease is much lower among negroes than among infected whites. The apparent immunity to malaria exhibited by peoples living in malarial districts is to be explained as the result of an acquired tolerance. The greater the intensity of the infection, the earlier in life will the community be infected and at the time of maturity all who have survived will have acquired tolerance. It is not yet demonstrated that by this means a more resistant race is evolved. That the European is more liable to intestinal disorders in India than the native is probably to be explained on the assumption that the European is at the mercy of his native servants and that his illness is always recorded.

It is now generally accepted that a relative immunity to tuberculosis does exist in certain races, but the usual explanation of this fact is that the relative incidence of the disease is nothing more than a reflection of antecedent contact with the disease. The negro and other less highly organised peoples are highly susceptible to this infection. The long industrialised community is relatively free. Surveys, in which modern tuberculin tests were made, have shown, however, that the difference between peoples is exactly the same as that between urban and rural communities. The civilised peoples and the urban populations show a high morbidity and a low mortality, whereas the non-industrialised peoples and the rural communities exhibit a low morbidity but a very high mortality, the disease occurring among them in its most acute form. Figures showing the incidence by nationalities per 1,000 men during a twelvemonth among the French army of

occupation (Lasnet and Treband) are of interest in this connection.

Senegalese	...	...	86·07
Malgaches	...	...	18·88
Annamites	...	...	15·31
Arabs	...	...	13·33
Moroccans	...	...	11·73
French	...	...	9·55

There is no reason to hold that these differences are indications of genetic dissimilarity, although in the matter of susceptibility to tuberculosis it may be that they are in respect of general physiological characterisation. It is sufficient to regard them as the result of differences in previous exposure to the disease.

The application of the Schick test to populations seems to show that in the case of diphtheria the incidence of the disease is determined by the extent of the opportunities for contracting the disease and not by any special natural immunity. The reputed immunity of the Mongolian to scarlet fever does not appear to exist in fact. It would appear to be the case that this disease is more prevalent and virulent in Northern than in Southern China, but this difference cannot be related to any genetic difference between the peoples. There is no critical evidence which supports the contention that the white is less susceptible to leprosy than is the coloured or that an admixture of dark blood increases the liability to contract leprosy and elephantiasis. Such racial differences are to be explained as indications of differences in sanitation and habits.

Until recently it has not been possible to discuss at all satisfactorily the question as to whether or not organic inheritance played any part in the incidence of cancer. Plentiful statistical studies have been made concerning the incidence of cancer in populations but these have yielded contradictory results, as they were bound to do because of the errors inherent in the data obtained from such sources. All such statistical evidence must be valueless until *post-mortem* examination has become exact. Such statistics as do exist can be used to show that cancerous patients have more cancerous relations than have patients suffering from other diseases, or, on the other hand, to show that they do not. The prejudiced can make their choice. Much attention has been paid to the occurrence of families in which a strikingly large proportion of members are cancerous. Undoubtedly such cancer families exist: the Bonaparte family, for example, in which Napoleon, his father, his brother Lucien, and two of his sisters, Pauline and Caroline, are all reported as having died of cancer of the stomach. But family tradition and belief, incomplete recording, inexact diagnosis, must remove much of the value of these records. Even though family history after family history is added to the list, the possibility that the concentration of cancer in families may still depend on chance alone and not be an indication of the heritability of cancer, must be considered. If ten per cent. of a population over forty years of age become cancerous, then chance may leave some families free and others will be crowded with cancerous individuals. But if a peculiar type of tumour or a peculiar site of tumour growth is considered, and if records show that either of these characterises members within a family and in successive generations, then the laws of chance become inadequate to explain the facts. Glioma of the retina is rare; it occurs in infants and its familial incidence is remarkable. Melano-sarcoma of the choroid of the left eye is recorded in a grandfather, a mother and her two sisters, and in a daughter. Twin sisters have developed a fibro-adenoma of the left breast, each of the same microscopic structure, occurring at the same age and in the same site. In one family all members who were not twins died of cancer, all the twins escaping. Of the forty-eight descendants of a cancerous grandfather, seventeen died from cancer (ten carcinoma of uterus and seven carcinoma of the stomach). There is no escape from the conclusion that a definite and marked susceptibility to cancer exists in certain families, being most pronounced in cases in which there is a cancerous history in both paternal and maternal lines. In these cases the tendency seems to be for the disease to appear earlier and to be more malignant.

There is no doubt concerning the inheritance of the tendency to develop benign tumours such as hereditary telangiactasis, multiple benign cystic epithelioma, multiple cartilaginous exostoses, von Recklinghausen's disease (multiple neurofibromatosis), and so forth, which bear resemblances to carcinoma. The mechanism of heredity is certainly such as could provide for the inheritance of susceptibility or of resistance to cancer.

The most ambitious genetical study of the influence of organic inheritance on the incidence of tumours in the mouse dealt with over 40,000 individuals and was continued for more than twelve years. The breeding system was carefully planned with stocks in which cancer is common, rare, and non-existent. No artificial influence known to affect the life processes of the mouse were allowed to operate during the course of the experiment. Epidemics were anticipated and the colonies were maintained under the best known conditions. All individuals were post-mortemed and some 5,000 spontaneous tumours, mostly malignant, were observed. From this most critical experimentation the following conclusions were reached. Cancer in the mouse appears in most of the forms encountered in man; mammary carcinoma, papillary adenomata, and carcinomata of the lung, primary liver tumours, sarcomata, squamous carcinoma of the skin and mouth, testicular tumours, basal-cell carcinoma of the head, squamous carcinoma of the stomach, papillary adenoma of the ovary, primary renal and suprarenal tumours, leiomyomata of the uterus, were all encountered.

The tendency to develop cancer or the capacity to resist cancer is unquestionably influenced by organic inheritance. Strains were developed in which not a single case of tumour development was seen for as many as thirty generations. In other strains cancer became so common as to be the sole cause of death of the individuals comprising them. The resistance to cancer in these mice behaved as a typical dominant character, proneness to develop cancer as a recessive. Cancer developing and non-cancer developing tendencies segregated as unit characters. Moreover, not only was the incidence of cancer influenced by organic inheritance but so also were the site and the character of the cancer. In certain strains the typical tumour was sarcoma, in others sarcoma was never encountered. In some strains the tumour was invariably mammary in its location, in others it was always hepatic, in yet another

it was testicular. In the cow, it will be remembered that mammary neoplasms are extremely rare, hepatic and adrenal common; in swine the commonest tumour is embryonic adeno-sarcoma of the kidney; in rats sarcomata are more common than carcinomata; in the negro the uterine leiomyoma is exceedingly frequent.

The behaviour of the tumour was found to be influenced by organic inheritance as was seen in the peculiar localisation of secondary tumour growths. Certain types of mammary neoplasms, for example, invariably led to pulmonary metastases in some strains, whereas in other strains they did not.

In the case of the rat it has been found that experimental infection with the tapeworm, *Taenia crassicollis*, is followed in certain strains, but not in all, by the development of sarcomata of the liver. By breeding together these susceptible rats, strains were developed in which all the individuals developed the sarcomata after infection.

The bearing of this experimental evidence upon the problem of human cancer is clear. Cancer in the experimental animals is, in all essential respects, the same disease as cancer in the human. The fundamental laws of genetics apply to all forms, experimental animals and men alike. Many records of human cancer point to the conclusion that its mode of inheritance is the same as that which obtains in the case of cancer among experimental quickly-reproducing forms. Other characters, normal and abnormal, are inherited in a significantly orderly fashion in the human and so there is every reason to hold that the human hereditary mechanism is the same as that which has been shown to exist in the experimental forms. The statistical data concerning cancer can be reconciled with the finding that the tendency to develop cancer is a genetic recessive character. It should be stated, however, that there are pedigrees in which carcinoma of the stomach behaves as a dominant The suggestion which emerges from these considerations is that particular attention should be paid to the recording of the family histories of individuals both of whose parents have suffered from cancer. Such histories must be supported by critical *post-mortem* findings. If, as seems probable, cancer in the human requires for its development an exciting cause, then not every individual possessing the necessary genetic basis for its development will become cancerous. This qualification must be noted when pedigrees are examined and prognosis made.

On the Incidence of Bovine and of Human Tuberculosis in the Island of Jersey.

By Lieut.-Col. P. FAUVRIN MARETT, States M.O.H., Jersey.

In the 1923 Annual Report, under the heading of "Laboratory" is the statement: "It is worthy of record that no case of bovine tuberculosis has been met with in cattle." This statement was based on the following *data*, which still hold good to-day.

1. Examinations of home-killed carcases at the public abattoir over a period of two years.
2. Examinations of milk samples.
3. Enquiries made of the veterinary surgeons practising in the Island.

Under this heading information was obtained that some thirty years ago an outbreak of bovine tuberculosis had occurred on a farm, the infection having been introduced into the island by a greyhound. Drastic steps were taken and every animal on the farm was destroyed. Apart from this instance, there is no history of any bovine tuberculosis.

The law is very stringent and does not allow of the landing of any cattle in the Island, except at a definite quay, from which they are removed to the abattoir for slaughter.

4. All cattle for export are subjected to the tuberculin test. The figures for the last three years have been obtained from Mr. A. Le Sueur, Veterinary Surgeon, and are as follow:—

Year.	No. Tested.	Passed.	Doubtful.
1924	520	519	1
1925	400	400	—
1926	610	605	5

As regards immunity of the breed from bovine tuberculosis, when exported, the breed is as liable to infection as is any other bovine breed.

5. Where bovine tuberculosis exists, infection of the young human also occurs and is seen in the forms of tuberculous enteritis, tubercle of bone and tubercle of glands. In the Island these conditions are marked by their absence.

Turning to the incidence of human tuberculosis, the following table gives the necessary information as regards figures:—

MORTALITY RATES FOR ALL FORMS HUMAN TUBERCULOSIS

Population.	*Year.*	*Total deaths.*	*Rate per 1000.*	*Remarks.*
52,576	1901	78	1·48	
,,	1902	87	1·66	Total deaths for five years = 416. Quinquennial rate = 1·58 per 1000.
,,	1903	96	1·82	
,,	1904	80	1·52	
,,	1905	75	1·42	
,,	1906	78	1·48	
,,	1907	83	1·57	Total deaths for five years = 405. Quinquennial rate = 1·54 per 1000.
,,	1908	83	1·57	
,,	1909	92	1·74	
,,	1910	69	1·31	
51,903	1911	87	1·67	
,,	1912	75	1·44	Total deaths for five years = 391. Quinquennial rate = 1·50 per 1000.
,,	1913	67	1·29	
,,	1914	81	1·56	
,,	1915	81	1·56	
,,	1916	75	1·44	
45,600	1917	97	2·15	Total deaths for five years = 400. Quinquennial rate = 1·65 per 1000.
,,	1918	101	2·24	
50,000	1919	71	1·42	
,,	1920	56	1·12	
49,519	1921	65	1·31	
49,760	1922	86	1·73	Total deaths for five years = 327. Quinquennial rate = 1·31 per 1000.
50,000	1923	62	1·24	
,,	1924	65	1·3	
,,	1925	49	·98	
,,	1926	54	1·08	

The quinquennial rate of fall up to the war years was ·04 per 1000. Instead of the war rise to 1·65 per 1000, a fall to 1·46 per 1000 might have been expected. With the

removal of the factors, war and influenza, the 1921-1925 rate might have dropped to 1·42 per 1000 instead of to 1·31 per 1000.

During the last four years, 1923-1926, the death rate for the period works out at 1·15 per 1000.

A short discussion of the various factors present in Jersey may be of use.

1. Apparently from the fact that no immunity is developed in infancy from exposure to bovine tubercle, acute cases occur in early life with an onset simulating influenza, and which in the past have probably been registered as influenza. Cases of this type of lung infection have been met with in children as young as nine years of age. The age incidence of this group is from nine-eighteen years of age. Cases of tuberculous meningitis occur in infancy, in homes where there are adult cases of tuberculosis of lung.

The attack rate of the ordinary forms of tubercle of lung is greater in females than in males—about three females to two males, whilst the average age at death for women is 30·6 years, that for men is 47 years.

2. From the above table it will be seen that the rate of fall in tubercle, which has been general, was held up by the war period, during which it rose.

For the first three quinquennial periods the fall was at the rate of ·04 per 1000; had the war not intervened, one would have expected a further fall of ·04 per 1000 to a quinquennial rate of 1·46 per 1000. Two factors prevented this fall, the one was the factor due to insufficient nutrition, the other the influenza epidemic, which, in 1918, was the cause of an annual rise to 2·24 per 1000 deaths from all forms of tubercle.

3. In the quinquennial period, 1921-1925, had the ·04 per 1000 fall been resumed, one would have expected a quinquennial rate of 1·42 per 1000 instead of a drop to 1·31 per 1000.

Since 1922, when the Laboratory was opened, work has been carried out on lung infections and blastomycosis of lung has been treated. This paper is too short to deal with this factor further than to say that blastomycosis of lung simulates tubercle and is a pre-tuberculous condition.

The following figures give an approximate incidence of these two diseases:—

Pure tuberculosis infection =21·15 per cent. Pure blastomycosis infection =42·3 per cent. Mixed tuberculosis and blastomycosis infection =36·5 per cent.

Blastomycotic infections in cattle have been reported, especially in Italy, where Samplice states that bovine tuberculosis is a more acute condition in the presence of the added blastomycete.

In Jersey, blastomycetes, of the same type as found in human sufferers, have been isolated from milks.

London's Clean Milk Supply.

"In these days when we hear so much, sometimes from quarters not disinterested, regarding the poor standard of the milk supply, the report of the public analyst on the milk supply to the City of London is reassuring," says the *Farmer and Stockbreeder* of September 5th. "He was struck by the exceptional cleanness of the milk, and found no case of tuberculous milk. Further, in three instances only did the quality of the milk come under suspicion."

Carnivorous Feeds and Feeding.*

By Rudolph H. Schneider, Boston, Mass.,
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The business of being a worthwhile veterinarian is a serious business, and requires that we think and do worthwhile things. Correlated with and inseparable from our professional duties are our educational obligations to owners of animals. Our mission is primarily that of treating sick animals—to cure them of their ills, in the shortest possible time. To do so we must exercise every possible means at our disposal. Thus, we find it is not merely a matter of diagnosis and prescription writing, but includes such accessory measures as the regulation of the diet, hygienic control, and the like.

I have chosen as my subject a discussion of the feeds and feeding of carnivorous animals, because I believe it is a key whereby we can make ourselves worthwhile and instructive in a subject that is scantily understood, hence leading to much harm and confusion. What we need is a common standard, the facts of which I hope to bring forth in this paper, so that eventually dog-owners may learn, through you all, to feed the proper foodstuffs as religiously as they now avoid them.

The feeding of animals, both in health and disease, constitutes no little portion of our armamentarium in avoiding and combating sickness. In fact, so vital is it, I believe we could get along fairly well with it alone, both as a preventive measure and a curative agent. We all realize that a large portion of the indispositions of dogs are traceable to faulty feeding and a good many cures can be wrought by the institution of proper dietetics. As an example I will cite a case brought to my attention by the owner of a pack of hounds.

One after another of his dogs developed "fright disease" or "running fits," until all of the pack became afflicted with these periodic seizures. What was the cause and how was it to be corrected? I directed him to discontinue the feeding of dog breads and put them on a diet of raw beef, milk, green vegetables and stale whole-wheat bread. Soon after this change the trouble ceased. But this is not all, for I was soon to learn that the amelioration was only temporary. Questioning revealed that he was feeding his dogs essentially the same as I had directed, but that he had again found a new plan of economy, and was feeding ground refuse bread, procured from hotels, instead of the stale and dried whole-wheat bread. Examination of samples revealed that the bread had fermented and soured. The previously suggested diet was again instituted, and soon order was once more restored, now permanently, for there has been no further trouble in a year's time. This is only one instance of many in which the diet was the causative as well as the curative agent.

In this particular malady, fright fits, I am thoroughly convinced that the trouble can be traced to the stomach, in most instances. Not solely because of the feeding of dog breads and other prepared foods, though they play an important rôle in this respect, but from other indigestible foodstuffs, such as improperly prepared carrots, boiled

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liver, and the like. Such acute cases are promptly alleviated by the administration of an emetic. It is to be remembered that similar seizures are often premonitory to the onset of other maladies, notably distemper.

Eczema Caused by Faulty Diet.

Unquestionably, a large portion of our eczema cases are likewise brought about by a faulty diet. There are differences of opinion relative to the type of food conducive to this trouble. I am convinced that the carbohydrates are in a large measure prone to produce the disturbance in dogs, due to their heating proclivities, while in cats it is most often due to continued feeding of canned salmon or cooked liver. However, I am also reasonably sure that in either case the lack of fresh, uncooked food plays an important rôle.

We are all acquainted with the appalling prevalence of malnutrition we find in the majority of young dogs—emaciated, rickety, spiritless, and what not. Why? Principally because they have been improperly fed. The staff of life—meat and milk—is denied them. Dog breads have supplanted the old stand-bys. Sure enough they like them. Yes! They would probably like shoe leather if that was all they got to eat. If a dog develops fits, the owner will promptly advise you that the patient stole a meat ball and she is sure that it is at fault. If so, it is probably because the pup became hysterical from the delight afforded by such a rare bit. Such indigestible foods are no more fitted to them than the same would be to an infant baby, and who would think of feeding a young child baked biscuits, even though properly balanced?

This is only a trifle, compared with the vast amount of medication they receive in a vain effort to overcome the indispositions caused by their feeding. Is there any wonder that they fall prey to diseases? I often wonder that there are not more that succumb to distemper. There is constant talk of specific medication for this malady, but what could we expect if we had it? Certainly not much, in the type of dogs that are reared nowadays. In this deplorable state of affairs we can and should make it our duty to do much missionary work. To me it seems well spent energy to take the time to explain to owners, at every available opportunity, the importance of properly feeding these little waifs. You yourselves will eventually benefit on future calls, when, in all likelihood, you will find a dog that has not only built up a body but a resistance behind it that will help you in your efforts to restore him to order, from whatever may be the indisposition.

Again, there is a form of apostematous dermatitis, a scurvy-like affliction, and a form of paresis in dogs, both of which can be traced to faulty feeding. These will usually be found in dogs continually fed on cooked food and those lacking in certain necessary vitamins.

Natural Foods Desirable.

The small animals we have to deal with most belong to the classification—carnivora. As the name implies—flesh-devouring—the essential part of the diet consists of the proteins, and is derived from the animal kingdom. Although a good many of these animals can adapt themselves to non-carnivorous foods as readily as they have to their unnatural mode of living under domestication, the fact still remains that the majority will do much better on their natural foods, as they would also were they allowed to live in the manner that most becomes them.

All foodstuffs are essentially the same, in that they contain all the elements necessary for growth and function of the animal body, whether they are derived from the animal or vegetable kingdom, but they are not similarly digestible in all animals. In carnivorous animals the major part of digestion is gastric, while in the herbivora, the intestinal functions are paramount, the stomach functions being mostly preparatory in character. In omnivora we have a combining form of digestion. By reason of the dog's intended diet, there is little need of salivary digestion and he bolts his food. Foods, then, that require this form of digestion are therefore more or less harmful to the dog as he will likewise bolt them as he does his meat. If fed they should be given in a form that will require mastication. In herbivora, on the other hand, mastication is of vital importance, hence the lengthy function. Correspondingly, the other internal organs are relatively larger and smaller, depending upon their requirements.

In the dog, as in other animals, there is need of the carbohydrates and fats, but in a lesser degree, hence the lesser necessity for a long intestinal tract. These foods are the fattening and heating elements for the animal economy. There is little radiation of heat and penetration of cold through the skin and hair-coat of the dog, and it may be that that is why they requires less of these elements in their rations. Under natural circumstances carbohydrates are derived from the glycogenic content of the muscles and liver consumed, while the fat, of course, is obtained from the adipose tissue eaten.

Dogs Must Have Meat.

You will see from what I have said that a totally animal diet is complete in itself for all the requirements of the carnivorous organism, and you will realise how intricately complete it is in every essential before I am finished. Our aim must be to duplicate this natural diet in adapting a mode of feeding. Circumstances are materially different, yet the ration must be essentially the same. In the cat we have less to worry about as long as we allow him some freedom and do not overfeed him, for he will supply himself with some unimprovable meals, derived from the carcasses of the small rodents and birds he preys upon. The dog, however, requires especial attention. Fundamentally, as stated, he must have meat. At least half of his diet should consist of this element. An abundance of meat during the growing period without question produces a body more resistant to disease and conducive to a greater come-back after infection. Lean flesh has practically no fattening powers and we may look to it as a good article of diet in obese patients. It is satisfying, yet letting the animal derive its carbohydrate and fat from his own economy until a proper balance and condition are restored.

Beef is our most natural and best selection for meat supply, although for the sake of variety and to meet certain necessities lamb, horse flesh and fresh fish may be substituted. Not only are the fleshly structures of the carcass to be thought of, but also the glandular and internal organs, as the heart, pancreas, liver and kidneys. How-

ever, it would be far better to adhere strictly to the feeding of the muscular parts than the glandular elements, though both are essential, the latter being particularly rich in vitamins. The best form in which to feed meats, *especially the glandular forms, is raw.*

Fish, if fed to the dog as a meat substitute, had better be boiled, so that the bones may be picked out before being fed. If cooked meats are fed, they had better be roasted, boiled or broiled but *not fried.* For the cat, fresh uncooked or parboiled fish, raw beef, and *uncooked liver* are suitable. Canned, smoked, salted, spiced and dried meat preparations, as well as pork, are taboo, and should never be fed the dog or cat, as they are decidedly detrimental to their well being. Fish is readily digestible, yet not so nourishing as other meats. As with other foodstuffs, idiosyncrasies must be taken into consideration, as certain types of fleshy foods may be ill borne by certain individuals, while taken with impunity by others. This is more particularly true of fatty foods. As a rule, however, meat should be fed with the fat that comes with it. Always remember that there are more dogs suffering for want of meat than there are those that have suffered, or ever will, from its consumption.

Large Raw Bones are Important Part of Diet.

Large raw bones should always be allowed the dog. The gnawing of them improves the condition of the teeth, as well as supplying the animal with an additional supply of the necessary mineral salts, such as calcium, phosphorus and iron. These are especially necessary for the metabolism of the puppy. As a rule the dog can grind up and digest small bones with impunity, but as they sometimes lodge in the alimentary tract, they had better not be recommended. Muscular meats are notably deficient in vitamin content, but liver, heart and kidney are abundantly supplied with these vital nutritional and metabolic elements. Liver tops the list, with the others following in the order named. Raw eggs are a useful but expensive substitute for meat. They should not be forgotten, however, in nourishing the sick.

Let us now consider the carbohydrates as an element in the ration. They require little of our time, as they do not essentially interest us. They are the starches. They are derived principally from the vegetable kingdom and although they help to balance the ration, they are not generally suitable for the dog and cat, from the standpoint of digestibility.

Among the most acceptable vegetables for the dog are tomatoes, spinach, lettuce, carrots and onions. They contain an abundance of all the known vitamins, so essential in every diet. This fact can also be taken advantage of in the treatment of certain deficiency diseases. With the exception of carrots, these vegetables may be fed raw or cooked, but carrots must be mashed and boiled, else they are likely to cause serious digestive disturbances. As for the cereal grains, whole wheat is undoubtedly our best selection, cornmeal, barley, polished rice and whole rice being quite unsuitable. They are, however, all rich in growth-producing vitamins. Whole wheat is best fed in the form of a stale whole-wheat bread, preferably oven-dried as well, to avoid any chance of heating through fermentation.

Milk One of Our Greatest Foods.

Milk is one of our greatest foods, its main drawback being its excessive bulk. However, its virtues cannot be overlooked, especially in the young. It is a perfectly balanced foodstuff, containing all the necessary principles for proper development and is easily digested and assimilated by both young and old. It is rich in calcium and phosphorus and the three principal vitamins. For puppies it is all-sufficient for their needs, but soon has to be supplemented with raw meat, to keep pace with their development. Because of its high standard, it is a wonderful adjunct to other foods, both for its relish and high food value. There are some dogs that cannot tolerate whole milk, principally because of the aversion to its fat content. Such cases might better be given butter milk, which is equally wholesome as the whole milk but for the absence of fat. It also has the advantage of being more readily digested and, like sour milk, has been known to expel intestinal parasites. Milk is of course indispensable as a food for the sick, either alone or with eggs.

Although in the animal's natural state milk is fed only the young, through the dam, there is no good reason why we should not feed it to the dog as a regular part of his daily ration, as we do the cat. It makes a dainty dish for the mature dog who receives but the one substantial meal a day. It is best fed in the morning, with the hearty meal at night. No dog could ask for a more suitable ration than one consisting exclusively of milk and meats. Evaporated and condensed milks are not so valuable as the fresh whole milks, though relished by some individuals. Of the two, the evaporated is to be preferred, as it contains vitamins A and B and a little C. The condensed is entirely devoid of these elements.

Vitamins Must Be Considered.

The vitamin content of the various foodstuffs requires much consideration in selecting a diet for the dog. This is especially true during the growing age, but must never be lost sight of. Just what they are we do not know, except through their manifestations. They are practically the most vital of all food factors. There are three important vitamins, namely, A, B and C, and several others. Vitamin D really is intimately associated with vitamin A.

Vitamin A is fat-soluble and is known to insure against rickets and eye troubles. The fat-soluble vitamin is included in milk, butter, eggs, cod-liver oil, beef fat, glandular organs and leafy vegetables.

Vitamin B is water-soluble and is known as the anti-neuritic vitamin and has to do with growth. Its absence leads to dwarfishness, anæmia, stilted gait, and even paralysis. Yeast, nuts and grain germs are richest in this type of vitamin. These foods are not so suitable for the dog, as they are not readily digested. However, there is an abundance in liver. In addition, there is a goodly supply found in heart meat, kidneys, lettuce, carrots, tomatoes, oranges, whole and evaporated milk.

Vitamin C is also water-soluble and is known as the anti-scorbutic vitamin. It protects against skin troubles and unhealthy teeth. It is included in milk, a few vegetables and the citrous fruits. There is a plentiful supply, however, in suitable dog foods. Liver, heart and

kidney all contain vitamin C, liver again topping the list. Muscle meats are devoid of this element, as are the fats and oils like cod-liver oil, butter and also eggs. Whole milk and skim milk contain a small quantity. However, there are some suitable vegetables that are rich in this vitamin. Tomatoes, spinach and lettuce rank high, with carrots and onions rating lower in the scale. Oranges are also rich in this vitamin, and although the orange is not thought of as a dog food it is useful in cases presenting a deficiency of this element. Every one would do well to acquaint himself with these vitamins and where they are found in most abundance, for they are the wherewithal in the successful treatment of deficiency disturbances so common in our young dogs.

Feeding should occur at regularly stated times, as it becomes a habit with the dog, and at the time of anticipation digestion is at its best. Puppies should be fed little at a time and often, while the mature dog in health should do well with but one substantial feed per day. No hard and fast rule can be made as to the quantity of food a dog should receive, as this varies as much with different individuals as it does with the various breeds and the work required of them. The amount can be determined only by observation. A safe guide is to feed the least quantity necessary to be consistent with proper condition and functioning.

Paratyphoid (Salmonella) Infection of Calves in Kenya.

Discussion on Mr. R. Daubney's Paper.

(*Continued from Page* 802).

The President, Lt.-Col. A. G. Doherty, in opening the discussion, said that in his opinion the choice of a paper on Calf Paratyphoid for discussion at that meeting of the Association was a happy one. Before embarking on a discussion of the various aspects of the problem which it presented, he would like to voice his appreciation as President, that Mr. Daubney had placed before them the result of his work on that disease causing calf mortality.

As they knew, bovine abortion and the sterility caused by it were originally intended to be the subjects for discussion at that meeting. Unfortunately, owing to pressure of work, the promises could not be fulfilled. Their fulfilment was merely delayed, however.

It was fitting that mortality of young calves should be substituted as the next stage in the cattle farmers' routine in which economic loss was a serious matter. In that connection losses occasioned by sterility, delayed conception or "shy breeding" and mortality in very young calves did not, in his experience, create the alarm in the average stock farmer that they merited, and from that point of view it was their duty to throw as much daylight as possible on such serious causes of economic loss, not only to the individual owner but to the Colony's stockowners as a whole. Mortality in adult stock caused concern to owners, but cows that bore a calf once in two or three years, or unthrifty calves that would never grow into profitable beasts, would appear to escape the notice which such a state of affairs warranted.

For that reason he was hopeful that at their next meeting they would discuss abortion and its sterility aspect.

He trusted they would pardon that slight digression from the subject before them, but he thought they would agree that it was important.

Calf mortality was a subject in which he had always taken the keenest interest; perhaps more from the general administrative point of view than from the closer study of its pathogenic side, although it was from the very intimate aspect of the close association of a general practitioner in Ireland that he first met with the condition, amounting to an epidemic.

His experience then was of great interest and was not dissimilar to subsequent observations in this country. It was in the early days of creameries in Ireland when calf mortality was serious enough to come under the notice of Government. Professor Mettam and Professor Nocard worked on the problem. He was in practice with the late Mr. James Dawson in Co. Fermanagh and they were harrassed day and night with appeals for assistance from farmers who were losing calves extensively. After many *post-mortem* examinations and observations his Principal decided on a line of treatment which included the administration of a mild antiseptic solution in milk, warm from the cow, and ensured up to one gallon of whole milk a day for the first four weeks of the calf's life. The success of those measures, and the incidence of the condition in the wake of creamery construction which altered the feeding of calves in the areas affected by the creamery system, convinced him then that calf mortality with intestinal lesions must always be studied in its relationship to nutrition. Nutrition and malnutrition were expressions which were becoming increasingly common in explanations of pathological conditions.

One heard conditions ascribed to nutritional causes with a satisfying finality that must be a great solace to the diagnosticians, but, if they were to be in a position to confer real benefits, they must investigate closely and bring all their powers of research to bear on elucidating nature's reasons for supplying certain elements in the natural food supply of animals and what they might expect if it was interfered with. It was satisfactory to know that a food supply was deficient in certain materials, but it was of importance to discover why such materials were necessary to the metabolism of the animals concerned. The essayist had shown them clearly that micro-organisms prominent in the pathogenic conditions under discussion existed in the normal healthy intestine without causing trouble, until associated with certain other conditions listed under the heading of predisposing causes.

One of those predisposing factors was stated to be interference with the normal food supply of the young animal. It was difficult to criticise the results obtained along the lines adopted by the essayist in his work, so perhaps it would be for the benefit of discussion if he criticised the methods adopted and suggested additional avenues for exploration.

He was rather surprised to find no reference made to immunology. It was well known to workers on bovine abortion that the blood of calves newly born of immune cows did not contain agglutinins, but when the calf had had its first few feeds of colostrum those agglutinins appeared. Through being able to precipitate these agglutinins it was possible to demonstrate the effects of colostrum *minus* agglutinins on the young calf, also to show that the agglutinin content diminished in the milk as the lactation period advanced. It had further been shown that by feeding boiled colostrum mortality, with lesions identical with those of the usual fatal calf scours, was produced. The protective power of colostrum against intestinal troubles of very young calves would appear to have been demonstrated. In pursuing consideration of the various factors likely to influence the incidence of the condition, he would pass from the protective qualities of the colostrum to the all-important predisposing condition usually found in the system of milking and calf feeding on Kenya cattle farms.

The essayist referred, and quite rightly, to the effect of the prolonged fasting to which the young calves on their farms were usually subjected, and mentioned the practice of the native milker allowing what he considered sufficient milk for the calf to remain in the udder. There was a more important side to that question than the enforced fasting periods, which was the one stressed in the paper, and that was the altered consistency of the milk supplied to the calf under those conditions. It was well known that the solid content (particularly fat) of the milk yielded by the udder from the commencement to the end of the operation of

milking varied greatly and ranged from a very small amount at the beginning to a relatively large quantity towards the end. It could easily be understood, therefore, that under the system of milking, as discussed, sucking calves must receive a regular diet so high in solids, especially fats, as to be incapable of proper digestion by the young animal's digestive apparatus. The formation of curds which irritated gastric and intestinal mucous membranes and created favourable foci for propagation of any or all of the micro-organisms which had the intestinal tract of young animals as their normal habitat must be a natural sequence.

He did not think the immunity conveyed in the colostrum and early milk consumed by young calves was sufficient to cope with the effects of mismanagement of the calves so common on farms in Kenya. It was of importance, however, to the investigator who was seeking for causes of calf mortality. He was exceedingly glad to see that Mr. Daubney's investigations had led him to consider climatic conditions and the co-existence of tick-borne diseases as important factors. He thought, if they agreed that the causal organism of the condition under discussion was common to most normal alimentary tracts and became pathogenic under certain conditions, then the influence exerted by the climatic conditions described must be given their true significance.

In Kenya, the existence of tick-borne organisms in the systems of animals under examination for sickness due to any other cause could not be sufficiently emphasised by workers of experience in the laboratory or in the field, as most of their members were. The category of malnutrition in which the calf condition under discussion might be considered to be qualifying for inclusion was an outstanding example of that, and the large part of the paper devoted to that side of the question was sufficient to show how dangerous it would be to form conclusions without giving proper weight to influences from that quarter.

Beyond slight reference to a killed vaccine, the essayist had confined his paper to an etiological study and applied it to the several aspects presented.

In a discussion such as the one on which he hoped they were about to embark, the opener might be accused of remissness if the absence of detailed references to treatment and results were not commented on.

The discussion on calf mortality which took place at the first meeting of the Association last year brought forth expressions of opinion from various members, and none more valuable than that of the late Mr. Mervyn Reid, a field officer of experience. He was of the opinion that none of those forms of intestinal trouble were of importance when calves were allowed free run with their mothers during the first month of their lives. This had been his (the President's) experience and, co-incidental infections being eliminated, that method answered the purpose. Energy expended on treatment was misplaced and should be transferred to measures for prevention, the most important of which were clearly shown to be hygienic, *i.e.*, diet and management.

Before sitting down he would like to stress the importance of the closest co-operation between the field officer and the research worker in a matter of that kind. Observations carefully made and recorded, with a view to adding to their knowledge, gave a generous return in increasingly efficient measures for reducing mortality.

Mr. J. WALKER said he was very pleased to have had that opportunity of listening to the interesting paper by Mr. Daubney on Paratyphoid Infection.

Unfortunately, owing to his absence from headquarters on vacation leave, he was unable personally to follow the investigations, which were continued during his absence, in connection with calf mortality, but on reading through the paper under discussion there were some points on which he wished to remark.

It would be recollected that in 1925, a serious mortality in calves of from about three weeks to three months was reported on an estate in that Colony, and, in some instances, protozoal infections, such as *P. bigeminum*, anaplasma, *Spirillum theilerii*, *G. mutans*, were detected on microscopical examination of smears obtained from sick or dead calves; in other cases, nothing specific was seen and in view of the probability of the co-existence of other factors, particularly the method of feeding and rearing, Mr. Daubney was asked to make further observations thereon with the result that he isolated from the intestines and various organs of some sick and dead calves a bacillus which was described as possessing bacteriological characters and biological properties of the Gærtner Paratyphoid group, and which was considered to be responsible for the mortality commencing about the twenty-first day and reaching a maximum during the second month, predisposing causes being:—

(1) Youth.
(2) Prolonged periods of fasting, particularly in young animals.
(3) The administration of unsuitable food leading to mild non-specific digestive disturbances.
(4) The co-existence of tick-borne diseases.
(5) Unhygienic surroundings.
(6) Climatic conditions.

A paratyphoid infection had been recorded by Drs. Viljoen and Martinaglia in undipped calves of from one to four months, reared on dairy farms in several low-lying warm districts of the Transvaal, Union of South Africa, most frequently after heavy rains, in which important contributory factors, such as improper and irregular feeding, bad hygiene, tick-borne diseases, etc., were found to exist, but owing to which it was found impossible to determine the relative importance of the organisms *B. enteritidis* and *B. aertryck* types, which they isolated from sick calves. When visiting Bechuanaland in September, 1926, at the request of the Agricultural Chief Veterinary Officer, he attended a meeting of stockowners belonging to the Tati Concession, where dipping was not carried out, who reported "yellow liver" in dairy reared calves and which, from the history, would appear to be associated with tick-borne diseases, including heartwater, redwater, anaplasmosis, and methods of rearing.

The essayist had also referred to paratyphoid infections in Europe and elsewhere, and it would thus be noted that the so-called paratyphoid infection of calves had a wide distribution.

The participation of other diverse species of organisms, such as *B. coli*, *B. proteus* and *B. pyocyaneous* was found to be responsible for a certain number of deaths during the first four weeks of life in the Kenya investigation; indeed, the various species of organisms which had been isolated from calves reared on dairy farms lent suspicion to any of those being the originating cause.

To Mr. Walker's mind, the relative importance of the described paratyphoid organism as the primary etiological factor of the disease under discussion required elucidation. The Gærtner paratyphoid group contained bacteria of various types which were met with more or less frequently in the outer world and in the bodies of healthy men and animals and whose pathogenic rôle, if it existed at all, was not properly understood.

The differentiation between pathogenic and saprophytic bacilli existing in the intestines of healthy men and animals through the investigation of certain biological properties (fermentation of sugars, etc.) did not always give concordant results and, in general, it might be said that there was no bacteriological criterion by which organisms of the Salmonella type could be distinguished with certainty from each other.

As regarded the co-existence of tick-borne diseases, experimental work was carried out and observations made by the essayist with the object of eliminating or otherwise anaplasma infection as a primary etiological factor. As a result, the conclusion was arrived at that the majority of losses from paratyphoid are incurred independently from anaplasma infection, the conclusion being based on:—

(1) The recording in some instances of paratyphoid infection in calves prior to the termination of the incubative period for anaplasmosis.

(2) A comparison of the results of examination of specimens sent in, 44 per cent. of which were positive for

anaplasma as against 80 per cent. positive for paratyphoid, and,

(3) A comparison of the incidence of anaplasma and paratyphoid infections.

From Mr. Walker's observations, the existence of anaplasmosis by means of smear examination might be overlooked, especially in young animals, and in his experience it was unwise to rely on the examination of a smear or two to determine the existence or otherwise of anaplasmosis.

Little importance had been attached to the existence of other tick-borne diseases, viz., *P. bigeminum*, *Spirillum theilerii* and *Gonderia mutans*, all of which had been observed in calves where paratyphoid infection had been recorded as occurring.

He was acquainted with an instance in which paratyphoid bacilli were isolated from the intestines of an experimentally-produced East Coast fever case which was stabled where there was no history of paratyphoid having occurred in other cattle in the same building.

P. bigeminum infection, to his mind, played as great a rôle in the so-called paratyphoid infections as anaplasmosis. Its existence was frequently overlooked in smear examination of young animals, the incubative period of redwater under natural conditions being about 16 days; but, in practice, the disease manifested itself in susceptible calves exposed to tick infection from about the third to fifth week or thereabouts after exposure.

Spirillum theilerii had an incubative period of about 18 days and usually occurred about the same time as redwater in susceptible cattle exposed to natural infection, and as an independent disease producing anæmic changes it was usually not of much importance, but in association with redwater and other causes existing on dairy farms it assisted in lowering the vitality.

Considerable importance had been attached to the methods of rearing and feeding calves on the estate on which the disease was investigated and which was considered to produce digestive disturbances causing the development of a specific intestinal disease by the paratyphoid organism.

He was inclined to think, from the evidence at present available, that various factors were primarily responsible (more particularly protozoal infections, improper and irregular feeding and bad hygiene) resulting, *in some instances*, in a secondary infection by bacilli which under normal conditions were saprophytes in the alimentary tract, but which might become secondary invaders under influences which lowered the vitality or produced pathological changes in the tract and associated organs, liver, spleen, etc.

Dr. WHITWORTH, after expressing appreciation of Mr. Daubney's paper, said that he understood that the writer's observations had been made chiefly on one estate, namely, Powysland Estate, Molo. That estate was situated at an altitude of approximately 9,000 feet. Paratyphoid infection had been confirmed in calves which had died on farms in widely separated districts at much lower altitudes, *e.g.*, Gilgil, Laikipia, Donya Sabuk and Nairobi. The infection, therefore, was not confined to the higher altitudes.

The infection had been confirmed in only two bomas out of several on a certain farm, and the disease was not, as yet, confirmed in a number of calves which had died on neighbouring farms in the Molo District.

It would appear from that, that paratyphoid, if a specific fatal infection of calves, was not easily spread from boma to boma, or from farm to farm, and also that mortality in calves in the same district and apparently reared under similar conditions could not in many cases be put down to paratyphoid infection. This required some explanation.

With regard to the experiments conducted at the laboratory, he would like to ask Mr. Daubney to supply the following figures:—

(1) What number of calves were placed in contact with paratyphoid-infected calves at the laboratory, and what number of these contracted the infection and died?

(2) What number of calves were fed with paratyphoid infected fæces or with artificial cultures, and what number of these died?

He understood from discussions he had had with the writer of the paper during the year, that very few calves contracted fatal paratyphoid infection at the laboratory, either by "contact," or by feeding with the organism, and he would like to ask Mr. Daubney if he could suggest some reason for this in view of the fact that the experiments were carried out under varying conditions of hygiene, diet, etc.

Did the writer consider that the organism decreased in virulence on sub-culture?

The writer had demonstrated that feeding of cultures to calves resulted in a temperature reaction with mild or severe symptoms in the majority of cases, and that an immunity was established to subsequent feeding with cultures. If such feeding of cultures could be proved to give similar results—that was, low mortality and high immunity, when carried out at Powysland—would it be possible to attempt immunisation of calves by feeding with living cultures?

The charts on which the writer had demonstrated the incidence of paratyphoid infection, and anaplasmosis infection in calves, were interesting. It might be noted, however, that the peak of the paratyphoid mortality curve corresponded approximately with the time that redwater reactions would occur in these calves as a result of natural infection, and he thought that insufficient consideration had been given to the possible influence of redwater reactions, however mild, on the paratyphoid infection.

THE REPLY.

Replying to the discussion on the paper, Mr. DAUBNEY remarked that several points of great interest had been raised by the opener, and the other participants. The first of those points related to whether or not the particular paratyphoid infection dealt with in that paper could be regarded as a secondary infection. Colonel Doherty had stated that "The essayist has shown clearly that micro-organisms prominent in the pathogenic conditions under discussion exist in the normal healthy intestine without causing trouble until associated with certain other conditions, under the heading of pre-disposing causes." He had gone on further to say: "I think if we are agreed that the causal organism of the condition under discussion is common to most alimentary tracts, and becomes pathogenic under certain conditions, then I think the influence of the climatic conditions described must be given their true significance." While the first part of that statement was true in so far as it referred only to *Bacillus coli*, and organisms of the proteus, pyocyaneous and delayed lactose-fermenting groups, and to the mortality in calves under one month old associated with heavy infections of these organisms, it was quite opposed to the facts if intended to include also the mortality of older calves associated with that particular paratyphoid infection. It had already been stated that attempts to isolate the specific organism from calves on uninfected farms, and from animals dying either of the white scour type of disease, or from other diseases, had invariably failed, and the further statement had been made that organisms of the true Gærtner type were present only rarely in the intestines under these conditions. From a fairly extensive experience of the bacteriological flora of the bovine intestine, the writer could say that, with the exception of the proteus group of the bacilli, non-lactose fermenting organisms of the coli-typhoid group were quite rarely encountered in the intestines of healthy or diseased cattle, if one excepted the definite paratyphoid infection of calves now under discussion.

Numerous examinations had been made at the laboratory of the intestinal flora of animals dying from rinderpest, East Coast fever, and other diseases, and, as far as he was aware, in only two cases had organisms of that group been isolated. In one case a true xylose-fermenting Gærtner strain was isolated from the stomach and mesenteric glands of an animal dying from rinderpest with acute gastro-intestinal lesions; in the other case, what appeared

to be an anærogenic strain of Gærtner was isolated from the liver and gland of a calf experimentally infected with anaplasmosis. He (the writer), thought that Mr. Walker must be mistaken in his recollection, and was probably referring to the case of the animal infected with rinderpest. Colonel Doherty had referred to the investigations of Nocard and Mettam in Ireland, and stated that a line of treatment which ensured up to one gallon of milk per day for the first four weeks of life was entirely successful in controlling the mortality. The report on calf disease in Ireland by those authors was unfortunately not available, so that one did not know whether the condition was paratyphoid infection. The references to nutritional conditions, in so far as they suggested research into food deficiencies, were unfortunately beyond the scope of that paper, but, as already stated, one was bound to accord due weight to the possible effect of mismanagement of feeding in contributing to the diseases of the white scour type, *i.e.*, infections with *B. coli*, proteus, etc., and not to underrate its influence on farms infected with paratyphoid, although in their own experiments heavy milking by natives, as for cream production, did not appear to have any influence upon the reactions produced by feeding cultures.

With regard to the opener's reference to the transmission of agglutinins in the colostrum of the cow, certain observations had been carried out on these points, but as the *data* were still incomplete, no mention of them had been made in the actual paper. Experiments had shown that the calf deprived of colostrum died usually within 12 days of birth, from *B. coli* septicæmia. The writer had duplicated, as far as possible, the conditions of observations that he made upon those points in England, with the exception that the calves were placed in stables that had previously housed calves to which cultures of paratyphoid bacilli had been fed, and in one instance a calf receiving no colostrum had died during the first week of life showing septicæmia infection, both of *B. coli* and calf paratyphoid bacilli. Further observations had been made to ascertain whether cows with agglutinins for that organism in their blood would transmit these agglutinins through the colostrum to the calves. A number of cows were given two doses, one of killed, and one of live paratyphoid vaccine before calving. At the time of calving the maximum agglutinating titre of the blood of these cows varied from 1 : 80 to 1 : 640. The globulin fraction of the colostrum of these cows contained similar agglutinins in most cases equal in titre to that of the blood. The blood of these calves did not show any agglutination before receiving colostrum, and after colostrum only one calf out of seven agglutinated the bacilli at all. In the case of that calf the blood had a maximum titre of 1 : 80 although that of the mother and of the colostrum was 1 : 640. In view of the age at which calves became infected with paratyphoid, it did not appear at all likely that the incidence of the disease would be affected in any way by agglutinins transmitted in the colostrum of the cow.

With reference to the opener's discussion on the practice of leaving strippings for the calves, the writer agreed that possibly the higher fat content might assist in producing intestinal disorders, but he deprecated the mention of curds, which were, after all, normal to the digestion of milk by calves.

So far as tick-borne diseases were concerned, he thought that due consideration had been given to this factor during the investigations. Information plotted on the charts showed that the peak of both deaths and paratyphoid infection was reached during the second month of life, and that a very definite decline in mortality took place during the third month, whereas the infections with *anaplasma* did not commence until the 42nd day, and only reached 45 per cent. of the total smears examined during the second month. During the third month deaths decreased by 60 per cent, while the smears positive for anaplasmosis increased by 35 per cent., making a total during this month of 23 positive smears out of 35 examined.

Colonel Doherty had stressed in turn each of the predisposing factors mentioned in the paper, and seemed inclined to attribute to any of them the primary rôle in the causation of these heavy losses. At the same time, he was quite emphatic about the success of measures ensuring an adequate supply of milk for the calf, or allowing it to run with its mother, during the first month of life. It was difficult to see how these measures could affect the influence of climate or the intercurrence of tick-borne infections, if either of these was as serious a menace as suggested.

Mr. Walker also appeared largely concerned with the pre-disposing conditions, and had asserted that certain of the tick-borne infections might have been overlooked. At the outset, in the outbreak referred to by Mr. Walker, smears had been examined independently by Mr. Walker, Dr. Whitworth, and the writer, and if one consulted the annual report for 1925 one would find that of a total of 60 animals from which smears taken at death were examined only 11 showed blood parasites, and of these five were light infections. In the compilation of these results, smear examination had been the only method used for the diagnosis of protozoal infections, and very careful examinations had been carried out, especially when any anæmic changes were observed in the smears. He, the writer, had seen no indications that redwater ought to be regarded as a serious infection in young calves; indeed, all the indications were absolutely to the contrary, and it was a recognised teaching that young calves possessed a high degree of resistance to natural or artificial infection with *B. bigemina*. He had not previously heard it suggested that either *B. mutans* or *Spironema* infections had any pathogenic significance in that country or in South Africa.

With reference to Mr. Walker's statement that there was no bacteriological criterion by which organisms of the Salmonella group could be distinguished from each other, he would like to point out that numerous workers, notably Jordan, Krumwiede, Uhlenhuth, Andrews, Bainbridge and Koser, had formulated very definite criteria for differentiation, and he felt that the bacteriological methods employed were wholly reliable.

He would like to emphasise again that there were certain clinical differences between infections with *Bacillus coli*, *Proteus*, etc., and infection with paratyphoid bacilli, which was much more severe in its course, and occurred at a later age. He also drew attention to the occurrence of bacteræmia at the beginning of the paratyphoid infections, a feature which was characteristic of the typhoid and paratyphoid diseases.

With reference to Dr. Whitworth's remarks about the altitude, it was not suggested that the infection was confined to higher altitudes, any more than the statement made in South Africa about its occurrence on low-lying farms was expected to be taken as excluding the occurrence of the disease in higher country. It was quite true that certain bomas on one farm had remained free from the disease while others were heavily infected, but more recently disease had spread to bomas that had previously been free. It was also a fact that there was a good deal of paratyphoid infection on other farms in the same district. In answer to the question about contact cases, no calves had been placed in contact with animals suffering from natural infection at the Laboratory, but a small number, probably five or six, had been placed in contact with calves to which cultures had been fed; of these, one contracted a fatal infection. A large number of calves of varying ages had been fed with cultures of the organism and of these four had died. In practically every instance, calves fed with cultures reacted typically, and a positive blood culture was obtained at the commencement of the reaction. The majority of these calves, however, recovered. He did not know the reason for the comparatively low percentage of fatal results, but it was quite possible that similar results would be obtained from the feeding of any other pathogen of this group. Some of the strains isolated certainly appeared to have decreased in virulence during cultivation, but other strains had maintained a virulence sufficiently high to produce an occasional fatal result after 12 months in sub-culture. An attempt to produce immunity by a feeding vaccine was at present being made.

(Continued at foot of second column next page.)

The Veterinary Record.

24th September, 1927.

THE CONGRESS OF 1927.

Last week we reported on the beginning of the Congress held during the week at Torquay. The Congress now being over, we may report a little further, alluding more especially to the business side of it, and in advance of the publication of the proceedings, which will be dealt with in a special double number of the *Record* in a fortnight's time.

Generally speaking, the Congress was a great success, and it is conceivable that in the importance which the National Veterinary Medical Association bears to professional life and policy, success and real utility are bound to be progressive. When, too, business is intermixed with pleasure and holiday making, we arrive at an ideal circumstance. Unfortunately, however, the social or holiday part of the week was marred by the inclemency of the weather, but certainly there was no damping of the ardour and enthusiasm of members, whose main business was the furtherance of professional causes, and the acquisition of knowledge and enlightenment in the many problems which confront the veterinary surgeon and scientist of the present day. We live and learn at all times, but we look to Conferences and Congresses for the full value of interchanged opinion. The subjects arranged in papers for discussion were well chosen, widely embracive of veterinary activity, and discussion was well and profitably sustained.

The proceedings, on publication, will repay careful study, especially to those who were unable to attend the Congress. The whole is evidence of the very great strides veterinary science has made in recent years, and while taking to ourselves comfort and joy in the satisfactory outcome of our professional efforts, individually and collectively, we have still to remind ourselves that we do not come under any standstill order, and that duty calls us to further progress. In the conduct of congresses, however, it must not be taken for granted that all is plain sailing or perfection. We profit by experience, as is intended, and certain aspects in the past congress, as in those of previous years, point to the consideration by Council of a more suitable, more complete, and less wearying system of dealing with the subjects presented. For instance, it does seem somewhat unfair to limit the essayist to so many words in his paper printed for congress, and at the same time to give greater latitude to the opener or openers of the discussion in written contributions. Then, again, with many minds and varying opinions which are always helpful, full opportunity for members joining in the discussion is very necessary, and, it need not be remarked, is always profitable. Whether papers are too numerous for the allotted time, or whether subjects could be arranged more conveniently and satisfactorily under Sections, are matters which it is desired should be put on an easily-running basis. The Council may be relied on to give effect to this aspect of conference.

A very pleasing and instructive feature of the Congress was the practical demonstrations, and we should like to take this opportunity of not only thanking those members who took part in the demonstrations, but of congratulating them on the highly skilful and dexterous manner in which the operations were carried out. More *kudos* is, perhaps, to be gained from expert surgery than from any other phase of veterinary activity, and it goes without saying that the skill displayed on this occasion of Congress in operations, some of which are of quite recent introduction in the domain of veterinary surgery, was the admiration of all who were privileged to witness them. It is by such excellence that we are judged, and our position as a profession is assured. For so admirable a setting and for so replete a programme the best thanks of the National Veterinary Medical Association are due to the Provisional Committee, for without their careful attention to all detail of arrangements the Congress would not have been the success it was either from the strictly business point of view or from the social side of it.

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With reference to Dr. Whitworth's remarks on the occurrence of *B. bigemina*, he would like to point out that it was extremely rare to find *B. bigemina* in smears from affected calves, and the incidence of this parasite was therefore not plotted on the charts showing the comparative incidence of anaplasmosis and paratyphoid. He could state, however, that of 108 smears examined when compiling that chart, only one showed *B. bigemina* infection. A very careful search had been made for this parasite, and every consideration had been given to the possible influence of this infection upon the occurrence of the disease. Smear examination again was the only means employed to diagnose redwater infection, and he could not believe that Dr. Whitworth was suggesting that the parasite could be responsible for death without appearing in the circulating blood in sufficient numbers to make diagnosis by smear examination practicable.

CLINICAL AND CASE REPORTS.

Rectal Injections of Potassium Permanganate combined with Iodine Intravenously in Acute Pneumonia and Toxæmic Conditions.

By Major H. ALLEN, R.A.V.C., Remount Depôt, Mona, Punjab.

In the *British Medical Journal* of the 17th July, 1926, there is an article on "The Thyroid and Manganese Treatment in Acute Pneumonia," by H. W. Nott, M.R.C.S., L.R.C.P.

I decided to give this method of treatment a trial in cases of pneumonia and virulent strangles with marked toxæmic symptoms, due to the system being saturated with septic material.

As excellent results have been obtained in ten cases of pneumonia and sixteen cases of irregular strangles, I am submitting this communication in the hope that other members of the profession will give the treatment a trial in similar conditions.

The treatment is based on the fact that thyroid and parathyroid efficiency is suffocated by effects of all toxæmias, whether acute or chronic; therefore the body should derive benefit from thyroid feeding or stimulation until the gland has regained its power.

As the active principle of the thyroid is believed to be due to a colloidal iodine, known as "iodothyrin" or "thyroxine," and contains 10 per cent. iodine, I use intravenous injections of iodine, 1 drachm; pot. iodide, 1 drachm; distilled water, 42 drachms. Forty minims of this solution contain approximately a half a grain of iodine.

Dosage.—For young stock horses: 25-50 c.c. in 100 c.c. of normal saline solution.

Full-aged horses: 50-100 c.c. in 200 c.c. normal saline solution, in conjunction with the manganese treatment every twenty-four hours until the temperature drops.

It is considered that the thyroid has a general acceleratory influence on all cell metabolism (protein). It starts and maintains the metabolic processes.

Functional activity of the thyroid may be decreased (hypothyroidism), or there may be a qualitative disturbance of the thyroid internal secretion, which is different from hypothyroidism and amounts to a perversion of function (dyserinism) and may account for toxic thyroid conditions.

The parathyroids are regulators to the needs of the body, neutralise the protein toxins incidental to certain conditions and regulate calcium metabolism in the animal economy. They also act as a sedative to the nervous system.

Manganese treatment.—All fæces are removed from the rectum by hand and two pints of water, at body temperature, containing 5 grains of potassium permanganate, are injected slowly; the tail is then depressed and kept so for fifteen to twenty minutes.

The injections are repeated every three to four hours, during the first twenty-four to thirty-six hours.

If the treatment is started on the first or second day of the disease, intervals of three to four hours can be allowed, but if beginning on the fourth or fifth day, especially when the symptoms are severe, the intervals may be reduced to three or even two hours.

Once the temperature reaches normal the injections are reduced to three a day for three days and once for three days.

There is a descent in the temperature by lysis in two to three days from the start of the treatment.

Cardiac tonics and stimulants may be needed in addition.

Captain Bell, R.A.V.C., Sarjodha Remount Depôt, and I, intend giving this treatment an extensive trial in cases of irregular strangles during the next strangles season, *i.e.*, from September, 1927 to August, 1928.

Roaring Operation.

By Lieut.-Col. H. T. RYAN, D.S.O., F.R.C.V.S., Cork.

There is a detail in connection with this operation which I have never seen mentioned in any articles or discussions on the subject and which, to my mind, is very important, *viz.*, whinnying or attempting to whinny soon after the operation.

Most writers say the horse should be closely watched for forty-eight hours after the operation in case difficult breathing should ensue, when it may be necessary to insert a tracheotomy tube; in fact, some advocate the insertion of tube immediately after the operation.

In my experience this difficult breathing only comes on in cases where the horse tries to whinny when he gets up after the operation, or soon after, on returning to stable, when he is expecting water or food.

I now make it a rule never to operate on "old favourites" in their own home.

In other cases, where I operate at the owner's place, I ask him to take precautions some days before the operation and to note if the horse whinnies—the reason why—and to take preventive measures.

I find I get good results if the horse does not try to whinny and poor results when he does.

Just one other point (and this I learned from Major Bagshaw), *viz.*, immediately after operation let the horse graze or pick up food from the stable floor.

No doubt some will say that the operation is practically bloodless and so it appears, but if this procedure is followed a certain amount of blood flows down the nostrils, and we all know that the less blood we leave after us on the site of operation, the better the result.

Bot Fly Nits.

By Lieut.-Col. H. T. RYAN, D.S.O., F.R.C.V.S., Cork.

To remove the above I find an old Gillette safety razor, with the blade loose, to be the most efficient way. It simply mows them off. Vinegar and weak solutions of acids do not seem to have the same effect as on lice nits.

Singeing with the summer coat on sounds simple, but is practically useless.

Previously I used a sharp searcher and found it good, but the safety razor beats them all.

Notes on an Outbreak of Chronic Nasal Catarrh in Cattle.

By GEORGE WILSON, M.R.C.V.S.

The following notes describing a chronic nasal catarrh in a herd of pedigree Jersey cattle are written in the hope that some of your readers may be able to give us the benefit of their experience of similar conditions.

The herd of pedigree Jerseys is kept under the best possible conditions, all have passed the tuberculin test and the average milk yield is over 900 gallons.

In the summer of 1923 a few cows were seen to have a slight nasal discharge—the local veterinary practitioner was consulted and prescribed potassium iodide which appeared to be effective.

In the summer of 1924 a few cows showed slight symptoms.

In the summer of 1925 a few heifers were affected.

In the autumn of 1926 symptoms appeared in one or two cows. In each of the above years the nasal discharge quickly disappeared when the animals were housed.

This year symptoms developed in one cow early in June and six cows out of eight and four heifers out of seven were affected in July. On approaching the byre, the noisy, snuffling respirations could be heard, but a muco-purulent nasal discharge was the only other symptom present, temperature in all cases being normal, appetite normal, milk yield not decreased, and the respirations, although noisy, were not hurried. There was no swelling of associated glands and the general condition of the cows was excellent, with the exception of the cow which was first affected—it had lost condition slightly. In the heifers also there was nothing abnormal, beyond the nasal discharge and noisy respirations. Two bulls which are never on the pasture were unaffected, as also were the pure-bred Jersey calves and a few cross-bred calves, which are on the same pasture.

Samples of the discharge were collected in sterile tubes and swabs taken from the nasal septum from each case. Microscopic examination showed remarkably few organisms present and culture on agar showed staphylococcus and diplococcus colonies; the latter appeared only after forty-eight hours' incubation and were small. Subcultures on blood agar grew readily.

The affected animals were now receiving iron tonics and daily nasal irrigations of 1 per cent. alum solution, using a syringe delivering a fine spray, but as this treatment did not appear to have any permanent beneficial effect, a vaccine was prepared from the staphylococcus and diplococcus. This has now been tried over a period on three heifers—one was kept permanently indoors while the other two were out all day and housed at night—the former is apparently cured while the latter show no improvement.

The cow most badly affected was brought in and at the end of two weeks was apparently quite cured; she was then allowed out to grass for a few hours on a warm, dry day and the symptoms immediately reappeared.

Two pure-bred calves are now slightly affected while five cross-bred calves in the same field remain free.

The owner has no doubt that housing the animals without any other treatment quickly causes the discharge to disappear, but immediately they return to the pasture

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the catarrh reappears; this suggests that it might be analogous to "hay fever," but the fact that the animals become affected at intervals from June to September, and that last year none were affected until the autumn, would appear not to support this theory.

Information regarding any similar outbreak, especially in Jersey cattle, with a note of the curative and preventive measures adopted, would be welcomed.

REVIEW.

("**Protozoology,**" by C. M. WENYON, C.M.G., C.B.E., M.B., B.Sc. In two volumes, xxvii. and 1,563 pages, with 565 illustrations and 20 coloured plates. Published by *Baillière, Tindall and Cox*, at four guineas net).

It is not often that a reviewer has the privilege of reading a book from which he can derive as much benefit as from Dr. Wenyon's "Protozoology," nor one which he can so whole-heartedly commend to others.

The subject of Protozoology has long been recognised to be one of the very greatest importance in tropical work, and the more recent additions to our knowledge regarding the distribution of such protozoa as *Trypanosoma equiperdum*, *Babesia bovis* and the coccidia, have shown that the subject may have a very direct and practical interest for workers in temperate and even cold climates.

The individual worker, however, and more especially one working far away from large centres and libraries, has found it increasingly difficult to keep up with the advances in our knowledge. The ever-growing and widely-scattered literature dealing with the familiar forms, and the frequent recognition and description of new species, have rendered it most difficult for such a worker to keep even a superficial grip of the subject as a whole; moreover, there has been much in current literature which has tended to confuse rather than to enlighten him.

There has, then, been urgent need for a book which would offer a sufficiently complete account of our present knowledge of the subject in the simplest possible form, and, while summarising our knowledge of the more directly important parts, would also cover the whole ground in such a way as to give the reader an intelligible idea of protozoa in general. Dr. Wenyon has undertaken the writing of such a book, and the result will command our admiration and gratitude. The book is addressed to medical men, veterinarians and zoologists, and the needs of the first two classes have been kept well in mind.

The first part, of 152 pages, is devoted to a general description of the morphology, physiology and life-histories of protozoa, with a discussion of such special points as immunity and the action of drugs.

In the second part, the first section deals with the classification of the protozoa, and even those who lack interest in this aspect of the subject, and who regard classification rather as a necessary evil, will find this section very straightforward and readable.

This section is followed by the main portion of the book, in which the whole phylum is surveyed, and the relations of protozoa to disease are adequately treated. Subjects of

particular importance to medical men, such as malaria and amœbic dysentery, are discussed in detail and important animal diseases, such as redwater and East Coast fever, are also given considerable prominence.

The treatment of the whole subject of trypanosomiasis is both clear and comprehensive, and this chapter will be read with ease and pleasure as well as with great profit.

There is also an excellent section dealing with the spirochætes, although the author considers that they cannot now be regarded as protozoa.

The final portion of the book contains some very useful lists of hosts, and an excellent chapter on methods of investigation.

In a work of this magnitude and one covering so wide a range, there are naturally particular points in connection with which some criticism might perhaps be offered. For example, the author does not appear to have realised the relative ease with which East Coast fever may be transmitted by the inoculation of coarsely-minced splenic tissue or lymphatic gland, nor the comparatively very large scale on which this has actually been carried out (in the Transkei) for prophylactic purposes.

Further, the description of anaplasmosis hardly does full justice to the patient and highly-important work of Theiler in separating the condition from redwater, clearly establishing its existence as a specific entity and its characters, and devising a most successful method of protective inoculation.

The author's system of classification will naturally not meet with universal approval, but many workers will warmly welcome its clearness and simplicity, and will agree with Dr. Wenyon in rejecting many of the generic and specific differences which have been recognised by others.

It is impossible to avoid controversial topics in a work of this kind, however, but while the author indicates very clearly his own opinion on a number of disputed points, the ideas of those who hold other views are very fairly stated.

The value of the book is greatly increased by the numerous illustrations, and the publisher's work has been well done.

Finally, in recommending it to veterinarians in general, one may say with confidence that this is a most excellent book which should be found in the library of every veterinary institution, while no veterinary worker in the tropics or sub-tropics can afford to be without it.

W. H. A.

ABSTRACTS.

[Investigation of the Effect of the Addition of Salvinol to the Drinking Water of Mammals. By H. ZELLER and W. WEDEMANN, *Berl. Tier. Wochenschr.*, vol. 43, No. 30, July 29, 1927, p. 489.].

Salvinol is a clear brown fluid with a neutral reaction, smelling of naphthalene and tar and slightly of petroleum, with a heavy brown oil as a base. The experiments were undertaken by the Imperial Board of Health. The animals used for testing purposes were a milking cow, three heifers, three sheep, two goats, two pigs, a horse, eight guinea-pigs and six rabbits.

The Salvinol was sprinkled on top of the drinking water in amounts equal to or exceeding those used in actual practice for mosquito and gnat destruction. Where the drinking water was refused the food was mashed with it, or in the case of the smaller animals it was given through a pipette. Daily administration for thirty-three days had no harmful effect on the cow, nor was the smell or taste of Salvinol present in the flesh and milk of this animal.

Experiments with the heifers, sheep, goats, pigs and horse were carried out for over ninety days, with no deleterious effects on the health of the animals and in the case of subsequent slaughter no tainting of the flesh or internal organs.

The product may, therefore, be safely recommended for use in drinking pools and troughs for domestic animals.

D. K.

[On Mycotic Peritonitis in Carnivora.—MM. ROBIN, LESBOUYRIES AND VECHU, AT A MEETING OF THE SOCIETÉ CENTRALE DE MÉDICINE VÉTÉRINAIRE, OCTOBER 7TH, 1926.].

The pathogenic action of streptothrices in the dog and cat is little known. The authors have had occasion to observe the consequences of their entrance and development in the peritoneum of carnivora. A dog and a cat present all the clinical signs of very slowly developing peritonitis and are sacrificed. In the peritoneal cavity is found a foul, greyish liquid, holding in suspension numerous white granulations of the size of a pin-head to that of a grain of rice, which give it that aspect of semolina broth observed by Sendrail and Cuillé in parasitic ascites of the dog. The serous membrane reacted strongly. These white grains, examined under the microscope, without colouring, also after colouring by Gram's method, seem to be formed of the elements of a fungus belonging to the streptothrix class.

Two rabbits inoculated subcutaneously succumb in twenty-four hours to gaseous gangrene. In a third, an abscess develops, which then becomes ulcerous; fistulæ are formed in different directions, and the subject dies of purulent peritonitis: in the pus of the fistulæ mycelian filaments are found. Two dogs that were inoculated presented, after some time, all the symptoms of subacute peritonitis; the evacuation of the liquid gives a stimulus to the development, and the subjects succumb. In the liquid and in the serous membrane are found in abundance the white grains observed in the spontaneous disease.

This observation allows us to insist on the slowness of the evolution of mycotic peritonitis, its apyretic character, the absence of marked disturbances of the main functions, the tension of the abdominal wall, the lack of clearness of the fluctuation, and the cloudy aspect of the liquid collected.

In the dog, the streptothrix attacked the serous membrane through a fistular parietal wound, in which it first developed; in the cat, the discovery of old erosions on the duodenal mucous membrane justifies the supposition that entrance was made by the digestive tract.

(Ex *Revue Vétérinaire*, July, 1927).

R L. HIGGINS.

[On Fowl Typhoid in Roumania. Its practical diagnosis by the intradermal reaction. DR. CERNALIANU, AT A MEETING OF THE SOCIETÉ CENTRALE DE MÉDECINE VÉTÉRINAIRE, OCTOBER 21ST, 1926.].

It was only in 1925 that fowl typhoid could be identified in Roumania. It appears with the same clinical table as in France and differs only by the more virulent and more toxic character of the causal germ; for this reason the author always failed in the preparation of an anti-gallinarum serum.

As in France, clinical diagnosis is difficult to establish; recourse must be had to bacteriological diagnosis.

The diagnosis established, the struggle against the infection should turn, above all, on tracing the germ-carrying birds in order to sacrifice them, for they do not benefit by vaccination. They will be recognised by injecting into the wattle an extract of *Bacillus gallinarum*: in infected fowl, this organ is lengthened and becomes three to eight times thicker than its congener which has not been injected. The author recommends sacrifice of the reactors, and vaccination only of the others, if a completely healthy poultry-yard is to be secured.

M. Truche insists, in his report, on the importance of this work, which shows the futility of vaccinating germ-carriers. It is a fact which explains failures in vaccination.

(Ex *Revue Vétérinaire*, July, 1927).

R. L. HIGGINS.

[Essential Purpura Haemorrhagica in the Dog. M. MARCEL PEZET IN A THESIS FOR THE DOCTORATE OF VETERINARY SCIENCE, PARIS, 1926.].

As a result of numerous observations collected in his Provençal practice, the author proposes in his thesis to present a clinical study of essential purpura hæmorrhagica in the dog.

Without denying the existence in this animal of infectious secondary forms of purpura, he asserts that essential purpura exists, and he defines it thus: "A pathological manifestation, appearing in complete health, under any circumstances and in any dog, characterised by hæmorrhages, at first (and sometimes exclusively), subcutaneous and sub-mucous, which are benign, then visceral, grave, and frequently fatal according to their position and importance.

He recognises a cutaneous form and a visceral form.

Cutaneous form:—In a dog, in excellent health, hæmorrhagic spots are discovered, situated under the skin of the belly, and on the inside of the thighs, on the gums, the sclerotic, the vulva or penis, and on the other visible mucous membranes. The spots are wine-coloured, do not disappear when pressed by the finger, and have around them no congestive zone; above, the epidermis is normal; it is not pruriginous. These spots may become confluent; in some cases they cover the whole body. The pathological evolution may stop there and disappear without otherwise manifesting its presence.

Visceral forms:—These appear suddenly, in complete health. *The gastro-intestinal form* is the most frequent; it appears in the expulsion of blackish diarrhœal stools, sticky, and of very vile odour. The temperature remains normal, the patients rapidly grow anæmic and feeble and may die, bled white. Vomiting of blood is sometimes observed. *The cerebral or medullary form* shows all the symptoms of cerebral or medullary hæmorrhage; it may be considered fatal. Death is frequently accompanied by vomiting of blood and the expulsion of coagulæ from the anus.

The pulmonary form is characterised by hæmoptysis pure and simple. Asphyxia is produced either by insufficient hæmatosis or by mechanical obstruction of the bronchi by the coagula.

The genito-urinary form shows itself by hæmaturia. In the bitch, it begins by an abortion, or the return of œstrum. It is rarely fatal.

To sum up, the dominating features in the clinical picture are sudden appearance, absence of commemorative signs and of general phenomena. These characters suffice to differentiate essential purpura from a certain number of other affections, in particular hæmorrhagic-enteritis, which is enzootic, seasonal, infectious, and accompanied by grave general symptoms.

In most cases, a cure is quickly obtained by increasing the coagulabilty of the blood by fresh sera or by calcium chloride.

(Ex *Revue Vétérinaire*, July, 1927).

R. L. HIGGINS.

REPORT.

The Intelligence Department of the Ministry of Agriculture.

The report of the work of the Intelligence Department for the two years 1924-26, just issued,* says the *Journal of the Ministry of Agriculture* (September issue), gives an account of the progress achieved in that period in the Ministry's schemes of research and advisory work, agricultural education, horticulture and live stock improvement. In presenting the report, Sir Daniel Hall expresses the hope that it shows that the resources which have been placed at the Ministry's disposal for such purposes have been economically used in the execution of a sound policy.

The period on the whole, was one of consolidation, and the progress rendered possible by the provision of the Corn Repeal Fund in 1921 has been secured.

Research Institutes.—In this period the Institutes of Agricultural Engineering at Oxford and of Animal Pathology at Cambridge were firmly established and have entered on what it is hoped will be long and distinguished careers. The Research Institutes may now be said to have reached a position of stability: the original scheme has been completed, and the research staffs, which expended rapidly after the war, are in process of settling down. The crying need now is the provision of endowment funds. With the creation of the Empire Marketing Board and the convening of an Imperial Agricultural Research Conference for next October, prospects of organised influence and helpfulness throughout the Empire are opening before the Research Institutes, the primary concern of which, however, must always be the interests of the British farmer.

The maintenance grants paid to Research Institutes were £149,910 in 1926-27 compared with £147,450 in 1925-26 and £134,710 in 1924-25. The capital grants in the two years totalled £10,700—a small sum compared with previous periods, the accommodation and equipment of the institutes now being reasonably complete.

Advisory Service.—In advisory work, the service of economic advisers in agriculture has been completed and now covers the whole country, and the number of assistants

* *Ministry of Agriculture and Fisheries Report on the Work of the Intelligence Department of the Ministry for the Two Years* 1924-26, H.M. Stationery Office, Adastral House, Kingsway, W.C. 2. Price 2s.6d. net.

for dairy bacteriology—a staff designed for the improvement of the milk supply—has been largely augmented. The services of chemists, entomologists and mycologists have been maintained at their full strength, and there are also a few advisory officers in veterinary science. A total of £57,820 was paid in grants to advisory centres in 1926-7 compared with £52,110 in 1925-26 and £41,670 in 1924-25.

Special Schemes of Research.—These schemes can be no more than mentioned in this short review. They relate to soil surveys, agricultural meteorology, crop variety testing, fruit variety testing, pig husbandry, new systems of farm management, electro-culture, basic slag, agricultural machinery testing, foot-and-mouth disease research, flax research, and field trials of Jerusalem artichokes.

Research Scholarships and Fellowships.—The scheme for selecting promising graduates (usually with first class honours in pure science) and training them in agricultural research in this country and abroad, to fit them for research and advisory posts, was continued, there being still a large demand for men. A similar scheme for securing recruits for the service of agricultural education was also continued. A number of travelling fellowships was again, in the period under review, awarded to agricultural research and advisory workers, to enable them to visit workers abroad, and keep abreast of the progress of research in their own and allied subjects.

Agricultural Education.—The new buildings at Leeds and Bangor were practically completed during the period, and Liverpool University have been promised a grant towards an extension of their Veterinary Department on a £ for £ basis. The National Institute of Poultry Husbandry at the Harper Adams College of Agriculture was practically finished, and now constitutes the best experimental and instructional plant in this country. Two new farm institutes were opened (in East Sussex and Carmarthen), making a total of 16.

Maintenance grants totalling £49,100 in 1925-26 and £48,500 in 1924-25 were paid to universities and agricultural colleges; and annual grants totalling £210,000 (approximately) in 1925-26 and £177,000 in 1924-25 were paid to county authorities. The number of regular "higher agricultural education" students appears to have settled down at about 2,000. In the two years 1925 to 1927, the total number of whole-time instructors and instructresses employed by County Councils rose from 293 to 339.

An important change in administrative policy regarding agricultural education provided for younger students was introduced towards the end of the period under review. Previously, the Ministry's grants were limited to agricultural education intended for students above the age of 16, and the Board of Education were responsible for aiding such agricultural education as was provided for students below that age. During 1925, a revised arrangement was come to between the two Departments, under which instruction in agriculture for students between the ages of 14 and 16, outside that provided in elementary and secondary schools, will in future be aided by the Ministry.

Among special educational schemes supervised directly by the Ministry, mention should be made of the Young Farmers' Club Movement. An Inspector was appointed early in 1925 to take charge of this scheme, and through his efforts a considerable development has taken place. The Young Farmers' Club Movement attracts boys and girls at an age which is often a turning point in their lives; hence, the Ministry regards it as a valuable means of stimulating the young to an interest in a rural career.

Dairying and Small Live Stock.—One of the most noteworthy features in dairying education is the increased attention that is being given to the question of clean milk production. The number of clean milk competitions held increased from 7 in 1923-24 to 34 in 1925-26, and the number of competitors from 181 to 843.

The rationing of dairy cows provides one of the surest means of reducing the cost of milk production to the farmer. The conclusion of a Committee, set up by the Ministry, on the subject was that the general administration of a scheme of advice on rationing, uniform in its main principles, was both practicable and desirable, and a standard scheme was outlined which provided for the utilisation of milk recording societies as extensively as possible.

It is the Ministry's policy to assist the development of the poultry industry mainly by facilitating the provision of instruction and advice by Local Education Authorities and, with the aid of grants from the Ministry, 53 County Authorities now employ expert instructors for this purpose. Under the Egg-Distribution Scheme, operating in forty counties, there were, in 1926, 324 station-holders, and the total distribution of eggs was 132,169, and of chicks, 68,252.

Scholarships.—The scheme of scholarships for the sons and daughters of agricultural workers has been successful. The experimental five-year period has just concluded and the Government has decided to continue the scheme in slightly amended form. . . . . .

Live Stock Improvement.—There was a very satisfactory measure of advance in the operations of the Live Stock Scheme during the period under review. Apart from the increase in the number of sires provided and the number of cows recorded under the Scheme, there has been a growing interest in questions closely allied to breeding. The services and advice of the Ministry's Live Stock Officers and of the County Organizers are being increasingly sought in connection with rationing, butter-fat testing, etc.†

The decline in the breeding of horses continued. Appreciable recovery was made, however, in regard to the operations of the Ministry's Heavy Horse Scheme which was revived in the season of 1924. Notwithstanding the somewhat serious position of the horse-breeing industry, it is satisfactory to note that the main object of the Horse Breeding Act, 1918, *viz.*, the elimination of the unsound travelling stallion, is being achieved in a very large measure. During the years under review, only five unlicensed stallions were reported on the road, and, in all cases, proceedings were instituted by the police.

Steady progress was maintained by the Milk-Recording Scheme, indicated not only by the steady increase in the number of members, but also by the improvement which has undoubtedly taken place in the manner in which records are being kept, and by the interest which members are taking in such matters as butter-fat tests and rationing. Another feature which is worthy of notice is the increasing stability of the societies operating under the scheme. In 1925-26, the number of samples taken for butter-fat tests was 108,000 compared with 72,000 two years previously.

In conclusion, in the volume recently published by the Ministry, *The Agricultural Output for England and Wales for* 1925, the total output of the land is estimated at 225 million pounds for that year. The State expenditure on agricultural education, research and allied activities may be taken in round figures at £700,000 per annum, *i.e.*, less than one-third of 1 per cent. of the agricultural output.

Heredity Congress in Berlin.

"The International Heredity Congress, which closed in Berlin yesterday," says the *Times* Berlin correspondent on September 18th, "decided to set up a commission with the object of framing and laying before the Governments concerned a patent law to protect the breeders of new varieties of animals or vegetables, and to ensure them a profit corresponding to the value to mankind of their invention. It is hoped that the scheme will be in readiness before the next congress meets in America in 1930.

"The suggestion was made by Professor Erwin Bauer, who, besides being President of the Congress, is in charge of the research institute at Dahlem, near Berlin."

† The Annual Report on the Live Stock Improvement Scheme for the year 1925-26, will be found on p. 418, of August issue of the *Journal of the Ministry of Agriculture.*

DIVISIONAL REPORT.

LANCASHIRE DIVISION.*

A Joint Meeting of the Lancashire Division and the North-Western Branch of the Society of Medical Officers of Health was held at the Public Health Laboratory, York Place, Manchester, on June 16th, 1927, at 3-30 p.m.

The chair was taken by the President of the Lancashire Division (Major J. H. Wright, O.B.E., M.R.C.V.S.), and the following members and visitors signed the attendance book:—Messrs. E. H. Curbishley, H. L. Torrance, P. T. Lindsay, J. K. Bateman, G. H. Locke, J. F. Dixon, J. Hall, A. M. Michaelis, A. W. Noel Pillers, E. J. Burndred, J. W. Brittlebank, R. Lovell, H. T. Matthews, E. F. Wood, R. Hughes, J. Spruell, W. Woods, J. Holroyd, R. C. Locke, T. Harrison, O. M. Holden, H. H. Steele Bodger, J. Robertson, C. R. Wood, E. J. Wrightly, J. H. P. Graham, Drs. A. Brindley, J. J. Butterworth, and Professor Topley.

The PRESIDENT stated that it had given the Lancashire Division great pleasure to arrange that meeting, and that their very best thanks were offered to Dr. Crewe for coming that afternoon to give his paper. The subject was one which was of much interest to the veterinary and medical professions, and he trusted Dr. Crewe would excuse them if they did not attempt to discuss his paper, as it was a subject which needed a lot of thought. They would, therefore, content themselves by listening to his paper and drawing their own conclusions afterwards. He had great pleasure in now calling upon Dr. Crewe.

[Dr. F. A. E. Crewe, of the Animal Breeding Research Department, University of Edinburgh, then presented the paper on "Natural Immunity," which is reproduced at the commencement of this issue of the *Record*.—ED.].

A vote of thanks to Dr. Crewe was proposed by Colonel BRITTLEBANK, seconded by Dr. BRINDLEY, and carried with great applause, and a similar tribute was paid to Professor Topley for his assistance in the arranging of the meeting, the loan of lantern, etc.

J. SPRUELL,
Hon. Secretary.

Livestock in British India, including Indian States, as ascertained by a Census held in 1924-25.

Oxen.		*Buffaloes.*	
Bulls	5,386,327	Male Buffaloes	5,576,494
Bullocks ...	47,556,336	Cow Buffaloes	15,152,417
Cows	40,258,697	Young Stock:	
Young Stock:		Buffalo Calves	11,469,176
Calves ...	33,330,138		32,188,087
	126,531,498		
Sheep ...	23,796,361		
Goats	34,851,182		
Horses and Ponies.			
Horses... ...	738,780	Mules	70,250
Mares	724,675	Donkeys ...	1,481,924
Young Stock:		Camels ...	633,365
Colts and Fillies	246,520		
	1,709,975		

* Received on August 29th.

NOTES AND NEWS.

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events.

Sept. 30th—Meeting of the North Wales Branch of the British Medical Association, Chester, at 2 p.m.
Oct. 5th—N.V.M.A. Committee and Council Meetings at 10 Red Lion Square.
Oct. 5th—R.C.V.S. Committee Meetings.
Oct. 6th—R.C.V.S. Committee Meetings.
Oct. 7th—R.C.V.S. Council Meetings.
Oct. 15th—Meeting of the Scottish Branch, Gleneagles, Perthshire.

The Congress Number of the "Record."

The issue of the *Veterinary Record* of October 8th will be a special double number, containing a full account of the proceedings at the Annual General Meeting at Torquay, together with reports of the Congress Dinner, the Public Lecture by Sir John M'Fadyean (*verbatim* report), the inaugural and closing meetings, the social functions, demonstrations and other features. A supplement will be published in the form of a reproduction of the large group photograph of the members at the Town Hall.

Veterinary Aid for the Animals of Poor Persons.

The Council of the Association, at their Meeting at Torquay, on Monday, September 12th, decided that, for the guidance of practitioners, immediate publication should be given in the *Record* to the following resolution which was unanimously adopted at that Meeting:

"That the Council of the Mational Veterinary Medical Association of Great Britain and Ireland has every sympathy with all efforts made to further humanity to animals, and that it feels sure that all members of the profession will, on all occasions where necessary, render assistance at reduced fees in deserving cases."

N.V.M.A. Clinical Prize Scheme for Students.

Students who are eligible to participate in the above scheme are reminded that their notes must be in the hands of the General Secretary, N.V.M.A., 10 Gray's Inn Square, London, W.C.1, by Friday, 7th October, 1927.

Erratum.—In the contribution from "G.M.," entitled "Some Queries," published in col. 1, page 782 of the *Record* of September 10th, the words "bovine disease" (Query No. 2) should read "Borna disease."

Personal.

Marriage: Taylor—Cousins.—On 7th September, 1927, at Kinawley Parish Church, Enniskillen, J. C. Taylor, M.R.C.V.S., to Pearl, elder daughter of Mr. and Mrs. John Cousins, of "Teemore," Enniskillen, Ireland.

. . . . . .

Presentation.—At a meeting of the Surrey District Veterinary Inspectors, held at Dorking recently, a presentation of a bronze and an illuminated address was made to Mr. A. C. Wild, M.R.C.V.S., on the occasion of his impending retirement from the position of chief veterinary inspector to the Surrey County Council.

Mr. C. W. Howard, who presided, made the presentation.

Mr. Wild, in reply, pointed out that during the last 20 years there had been no serious outbreak of contagious disease in the county, and that several outbreaks of foot-and-mouth disease had been confined to the seat of the outbreak. The great success in the administration of the various contagious diseases Acts was due to the active co-operation between the agriculturists of Surrey and the veterinary officers to the Council, and in any contemplated administrative change it was to be hoped nothing would be done which might in any degree disturb this cordial co-operation, which was the first essential to the control of disease.

Royal Sanitary Institute Course.

The course of training in meat and food inspection, arranged by the Royal Sanitary Institute, will commence on Friday, October 7th, and copies of the prospectus can now be obtained from the Secretary, 90 Buckingham Palace Road, S.W.1. The lectures are followed by the standard examinations of the Institute, which are recognised in all parts of the British Empire.

Tuberculosis Order Conviction.

"The Notts County Council are spending at the rate of over £10,000 a year in dealing with tuberculosis throughout the county, and if the cow-keepers will not co-operate with the authorities this expenditure is wasted," said Mr. E. B. Hibbert at Mansfield on September 9th, in prosecuting John Savidge, a Mansfield Woodhouse farmer of Ley Lane, for failing to report the fact that one of his cows was suffering from tuberculosis.

Mr. Hibbert explained that the provisions of the Act offered an inducement for prompt notification in that compensation to the amount of three-fourths of the market valuation was paid for cows not in an advanced state of tuberculosis and only one fourth if the animal was in an advanced state.

Last year, said Mr. Hibbert, 75 cases of tuberculosis in children under 15 years of age existed in the county, and medical authorities recognised that forms of tuberculosis were caused by consumption of tuberculous milk.

For the defence Mr. R. P. Marchant stated that Savidge had been ill for several months, he had not been long in the milk business, and he left the whole of the arrangements to his man, John Duffin.

Duffin, who said that although he had had ten years' experience of cows he had never had a tuberculous cow before, added that the milk from the animal in question was set aside and given to the pigs.

Savidge was fined £5 5s., including costs, and the Bench stated that they had been influenced by the fact that this was the first case of its kind locally, and the amount of the fine was not to be taken as a precedent.

Louth County Agricultural Committee decided to adopt the Donegal resolution calling on the Department of Agriculture to refuse premiums to bulls which have not passed the tuberculin test, and in respect of which a certificate to that effect is not produced in the show or at the sale.

Notanda.

It has been demonstrated experimentally that a severed optic nerve of a rat can re-unite and at least partially recover its function.

. . . . . .

It has been found that some protozoa are killed by oxygen. From this principle there may be evolved a method of successfully treating anaplasmosis, piroplasmosis, amœbiasis, etc. (*Vety. Med.*).

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In experiments in vitro, Lange and Feldt found that a 1 : 100,000 dilution of "Sanocrysin" had an inhibitory effect on the development of certain strains of tubercle bacilli. "Sanocrysin" treatment of tuberculous rabbits, guinea pigs, calves and sheep did not yield therapeutic results. It was difficult to judge the remedy. (*Zeit. für Hyg. und Infectionskrank*,, Berlin).

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Eggs from hens that have been freely exposed to sunlight are rich in Vitamin A and are of value as an anti-rachitic food. This vitamin has been found to be retained in eggs that were in storage for nine years.

. . . . . .

The pathology of asthma is by no means definite; it is clear, however, that some types of spasmodic asthma definitely come within the group which Freeman has termed "Toxic Idiopathies," certain food idiosyncrasies, animal asthmas, pollen fevers, etc., being caused by foreign proteins.

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In bronchial asthma where the disease is bacterial in origin, very good results have frequently followed the use of the Mixed Vaccine for Bronchial Asthma. H. K.

The Fat-Soluble Vitamins in Milk.

During the past decade evidence has accumulated steadily to show the importance to the health of infants of an adequate supply of fat-soluble vitamins. This fact has naturally prompted many investigations into the

factors influencing the fat-soluble vitamin content of cow's milk. The earlier experiments were somewhat inconclusive because they did not distinguish clearly between vitamin A, the growth-promoting factor, and vitamin D, the antirachitic factor. It is now known that green vegetables contain a rich supply of vitamin A but relatively little vitamin D. Feeding experiments on cows (Luce, 1924, Chick and Roscoe, 1926) showed that a ration rich in green fodder increased the vitamin A content of milk but had only a slight effect on the antirachitic factor. The problem of practical importance is to find a diet which will ensure that the cow's milk contains an adequate supply of both vitamins. The milk of pasture-fed cows contains both vitamins, but the difficulty is to produce an adequate content of vitamin D in winter milk. Golding, Soames, and Zilva[1] have shown that, whereas green fodder in the winter ration of the cow raises the vitamin A content but not the vitamin D content, yet addition of cod-liver oil to the cow's ration raises both the vitamin A and the vitamin D content of the milk; but unfortunately large doses of cod-liver oil decrease the fat content of the milk. These results are, however, of practical importance, since they indicate a method by which cow's milk of fairly high antirachitic potency can be obtained in winter. Moreover, they provide experimental support for the administration of cod-liver oil to nursing mothers to produce an antirachitic action in breast-fed infants.

British Medical Journal.

Music and Milk.

Among dairy folk there is a belief that a cow will yield more milk to a singing milker than to one who omits such "soothing stimulation"; indeed, the matter seems to go further, for some cows are said to discriminate, only giving full measure, or it may be any milk at all, in response to a particular melody. A practical trial of the effects of music was made in Germany in 1924, concerts being provided in the stalls at milking times on certain days. Secretion of milk takes place in two phases—slowly between milkings and rapidly (two-thirds of the total) during these operations. It was found that on concert days this latter secretion was increased by 6 per cent. compared with tuneless days, when the instrument employed was the gramophone or violin. It is hardly surprising that so pacific a function as milk-giving was not favourably influenced by the martial strains of the trumpet. On the concert days the total solids and fat of the milk were increased in amount but lessened in percentage. Nebert and Koch[2] of Halle, have tried to apply these observations to wet nurses, who were taken from their homes and placed in quiet comfortable surroundings; they gratefully responded to this treatment by an increased yield of milk, but they seem to have been less musical than the cows, for no further increase resulted on days when a gramophone played Handel's Largo and the Tales of Hoffman during resting periods, and brisk marches during actual nursing; perhaps instrument, composer, and type of music were not happily chosen. The women tested all had a good natural flow of milk; Nebert and Koch mean to make further tests with women whose milk is failing or scanty. Now that broadcasting has made music available throughout town and country, perhaps large scale experiments may be made in dairy farms and infant clinics, but it will be harder than ever for the B.B.C. to frame generally acceptable programmes if the requirements of the milk trade and of nursing mothers have to be considered. So much for the favourable influence of music. Is there risk of harmful effect? Little positive evidence is available, but the German trials with the trumpet suggest caution, and even before the days of saxophone and jazz band we had heard of the "tune that the old cow died of," and a well-known Scottish divine used to tell how, in boyhood, his cornet playing was first banned from the manse because it spoilt his father's sermons, and later from the hay loft because the cows in the byre below gave sour milk. Recent Chinese law[1] has specifically forbidden the sale of "milk having blue, purple, and other colours." Can it be that such startling dairy phenomena have resulted from the effects of Chinese music upon imported milch cows?

British Medical Journal.

[1] Golding, Soames, and Zilva: *Biochem. Journ.*, 20, p. 1336.

[2] Nebert and Koch: *Monatsschr. f. Kinderheilkunde*, 1926, 33, p. 385.

Swine Erysipelas in Man.

Swine erysipelas is a disease of pigs by no means uncommon in this country, and the cause of a considerable loss to farmers. It is characterised by the appearance of red, diamond-shaped blotches on the skin, and by the development of vegetations on the valves of the heart. The latter lesion has in recent years attracted the attention of comparative pathologists, mainly because of its resemblance to somewhat similar lesions associated with cardiac rheumatism. Its resemblance to that condition has proved to be more apparent than real, but it has been found to be very similar to the ulcerative endocarditis of human beings caused by streptococci, gonococci, and pneumococci. In this, as in swine erysipelas, the inflammation of the valve proceeds from the surface inwards, whereas in rheumatic carditis the inflammation commences in the depth of the valve and spreads towards the surface. The disease in pigs is caused by a specific bacillus, and numerous instances have been recorded in which human beings were infected with it, and developed an erysipeloid condition of the skin. The infection in man generally occurs through inoculation; and there is a tendency to regard the erysipelas of Rosenbach as identical with it. Klauder, Righter, and Harkins[2] have recently made a detailed study of a very similar condition occurring in fish handlers. Rosenbach's erysipeloid is seen most often in persons who handle game and fish, and is as a rule confined to the hands near the point of inoculation. The lesion consists of a sharply defined, slightly raised, reddened area, with few if any general symptoms; it has an incubation period of one to six days. Swine erysipelas in man is rather more severe in its symptoms, and lymphangitis may be present. The existence of a heart lesion has not yet been demonstrated. The series of outbreaks recorded in this paper occurred in fishermen on the sea coast of New Jersey. The lesions commence within twenty-four hours after a bite from a fish or a prick from the spine or scale, and the disease lasts from four to six weeks. The sore is conspicuous and painful; the lymph glands are affected, and headache and fever are common in the early stage. Similar but milder symptoms are seen in those who handle the fish later. This erysipeloid condition is quite different from the other skin diseases of fishermen such as dermatitis from nets, etc., and urticarial eruptions associated with new hemp nets or from

[1] Ting-An, L.: *Nat. Med. Journ. China*, 1925, 11, p. 324.

[2] *Arch. Dermat. and Syph.*, xiv., 662-678.

contact with fish such as the Portuguese man-of-war, and "stings" of various fish such as electric eels and catfish. Three strains of this bacillus are generally recognised—human, porcine, and murine; the authors believe that it may be necessary to add a fourth—a piscine—which is pathogenic to white mice and pigeons, but not to field mice; apparently it has a high virulence to man. The bacillus of swine erysipelas (*B. rhusiopathiae* or *B. murisepticus*) is apparently pathogenic to all groups of vertebrates, but its virulence varies with the different animals, and may be altered by passage. Man is relatively resistant to ingestion, but may be infected through the skin. It would seem that we may recognise at least three human conditions due to this organism: the erysipeloid of Rosenbach; "fish poisoning," as this condition is called locally; and finally human swine erysipelas. These conditions differ only in severity, the last being the most acute. *British Medical Journal.*

The National Museum of Australian Zoology.

(Reprinted from *The British Medical Journal*, June 18th, 1927).

In 1924 the Federal Parliament of Australia, knowing the fact that the unique native fauna of the Commonwealth was fast disappearing, and recognising its importance to medical science, founded the National Museum of Australian Zoology. It was a wise and statesmanlike act, the full effect of which is only now beginning to be seen. Dr. Colin Mackenzie was appointed Director, with the title of professor of comparative anatomy. It was a museum with a difference. In the previous year Professor Mackenzie had presented to the Commonwealth his specimens of living native animals, together with the buildings and fencing on the Research Reservation at Healesville. He had given also his collection of macroscopic and microscopic specimens, numbering many thousands; and these now form the basis of the museum collection. Each specimen has a direct application to some medical or surgical problem. Nothing quite like the collection of normal histological preparations from reptiles, monotremes, and marsupials, with which human or other mammalian tissue can be compared, exists anywhere in the world, and we are glad to know that illustrated atlases describing the collection are being prepared for publication—a huge enterprise which has been begun not a day too soon. Early in 1923, when commenting on the announcement that the Commonwealth Government had passed an Act to establish a Museum of Australian Zoology, we observed that there was clearly an obligation on Australia to preserve a full series of specimens, since the whole indigenous fauna of Australia seemed only too likely to follow Tasmanian man to extinction. The Commonwealth Legislature has now gone rather further than we hoped, for it has not only allotted a site for the National Museum of Australian Zoology at Canberra, the new capital of Australia, but the Federal Capital Commission has provided a site for a zoological park or reservation, in which will be kept living specimens of Australian and Tasmanian native animals in their natural state. The area of the site for the museum, laboratories, and lecture theatre is about five and a half acres, in a magnificant situation on Acton Hill, facing Parliament House. The research reservation or zoological park, containing about eighty acres, is on a peninsula bounded on two sides by the river Molonglo. The report of the Parliamentary Standing Committee on Public Works, dealing with the construction of buildings, has now been published, authorising for this purpose a sum approximating £100,000. The report has received the unanimous approval of the Federal Parliament, and the buildings, representing what is really the first stage in the establishment of the National University of Australia, will be begun immediately. When the buildings are completed every facility will be offered to workers—not only Australian, but also from other countries—wishing to study comparative anatomy and its application to modern medical and surgical practice. The museum is now at Melbourne, but is to be moved to Canberra next year To its original contents many important additions have recently been made, including the collection of specimens valued at £25,000 belonging to Dr. George Horne of Melbourne, dealing with the Stone Age men of Australia, and also a collection of aboriginal skulls made by Dr. Arthur Nankivell of Kerang. The museum also possesses the Froggatt entomological collection, and that of Mr. Murray Black dealing with the aborigines of South-East Victoria. The completely fossilised prehistoric Cohuna skull, together with many other specimens of anthropological value, belong to the museum. The Federal Government of Australia is to be congratulated on its decision to establish a centre for the advancement of comparative anatomy, which admittedly is the foundation of all the medical sciences. We may venture to express the hope that the lead now given by Professor Colin Mackenzie will encourage wealthy Australians to display a similar national spirit, and by liberal endowments help on the necessary research work in the interests of humanity.

The Irradiation of Laying Hens.

"An article in the *Journal of the Ministry of Agriculture* dealing with the effect of ultra-violet rays on laying hens describes some experiments carried out by Mr. Eric W. Mercer, under the direction of Professor Leonard Hill, at the Berks and Bucks Joint Sanatorium, Pepperd Common, Oxon., and, in view of claims that have recently been made, it is worth noting that the results do not appear to have justified the trouble and expense," says a correspondent to *The Times* in a recent issue. "The failure in this instance, however, is likely to stimulate further experiment, especially in view of the evidence contained in a paper read at the World's Poultry Congress by Messrs. J. S. Hughes, L. F. Payne, and W. M. Hinshaw, of the Agricultural College, Manhattan, Kansas, U.S.A.

"This paper dealt with the effect of irradiation on chickens as well as on laying hens, and some very definite results appear to have been obtained. In the case of chickens the ultra-violet light was resorted to as a means of combating the tendency to leg weakness among chickens reared indoors, and it was concluded that the trouble arose from lack of direct sunshine. With the adoption of the practice of brooding chickens artificially in large numbers, leg weakness, characterised by faulty bone formation, became a serious problem, and experiments with the vitamins A, B, and C failed to give the same satisfactory results among chickens reared under cover in the early part of the season as could be obtained with birds brought up under more natural conditions.

"The results obtained in Kansas appear to have been confirmed by many investigators and practical poultrymen in America, and the discovery that lack of direct sunshine or ultra-violet light was responsible for faulty bone formation in growing chicks led to experiments to ascertain whether similar treatment would have a beneficial effect on laying hens kept in close confinement. It is stated that the results were just as striking as they had been with chickens, and the pen receiving no ultra-violet light produced only 20 per cent. as many eggs as the birds that underwent the light treatment. Further tests for laying and hatchability confirmed these results, and the relation between vitamin D and ultra-violet light was determined by a feeding test which showed that eggs from hens receiving either vitamin D (cod-liver oil) or ultra-violet light (direct sunshine or mercury quartz lamp) had a much higher vitamin D content than eggs from the hens receiving only filtered sunlight through window glass.

"The need of extended investigation in this country, on similar lines to that conducted in Kansas and other parts of the United States, is emphasised by the fact that direct sunshine in winter is of comparatively little value, and with the modern tendency to resort more and more

to confined conditions for laying stock, in order to promote winter egg-production, the possibility of deriving some compensating advantage from artificial irradiation justifies exhaustive tests under various conditions. Even in America, although investigators appear to be convinced of the advantages of irradiation, many problems remain to be solved before it can be submitted in definite form for general commercial practice. It remains to be discovered, for instance, how much "vita" light, as the curative property of the ultra-violet light has been designated, there is in the sunshine at different seasons, the amount of "vita" light that gives the best results, and how it can be produced in the most convenient and economical form for practical poultrymen."

Condensed Machine-Skimmed Milk.

"The timidity of the Ministry of Health in dealing with imported articles compared with the rigidity of its action relating to corresponding commodities of home origin is noteworthy. The prominence that was given to the announcement of new conditions governing the distribution of imported condensed machine-skimmed milk induced hopes that some appreciable alteration was intended. Practically the only change is the enforced use of large type for the words 'Unfit for Babies,' on the labels. No modification is suggested that would ensure in the production of the articles compliance with conditions as to cleanliness, etc., required in this country. The old grievance remains that our authorities are prepared to accept as faultless any commodity that comes from abroad, while imposing such restrictions upon home production as hamper output and increase expenditure. It is remarkable how eager the authorities are to safeguard the health of the community where British produce is concerned, and how regardless of the same high ambition where the products of other countries are in question."—*The Times.*

A remarkable instance of a mare's long memory is reported from Warwickshire.

A year ago a Shuckburgh farmer sold a horse to a farmer in a village eleven miles away. The other day he was surprised to see the mare trot into the farmyard, come up to him, and then walk contentedly into the stable, where she made herself at home.

The mare answers to the name of Jewel, and had got out of her field during the night.

The course of infection with coccidiosis in cats has been studied by Andrews. One attack of coccidiosis seems to render cats and dogs non susceptible to subsequent infection by the same organism. This immunity lasts for seven months, and probably for life. Regarding human infections with *Isospora*, it is the opinion of Andrews that the disease is caused by a coccidium specific to man, and that human coccidiosis may occur much more frequently than reports indicate.—*Amer. Jour. Hygiene.*

In Binet and Fournier's experiments on dogs, withdrawal of a small amount of blood induced a considerable increase in the number of red corpuscles. After five minutes the number of red corpuscles began to decrease, and at the end of thirty minutes was below normal. The posthæmorrhagic polycythæmia was not observed in splenectomised animals or in those with a compressed splenic pedicle. The phenomenon tends to prove that polycythæmia after loss of blood is due to a contraction of the spleen, provoked by the hæmorrhages.—*Jour. A. M. A.*

The Editor acknowledges the receipt of the following:—Communications from Capt. T. J. Bosworth, Messrs. W. L. Little, R. A. S. Macdonald, J. A. Maybin, A. New, T. F. Prime, Major A. J. Thompson, and Mr. J. F. D. Tutt.

Victoria Veterinary Benevolent Fund.

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